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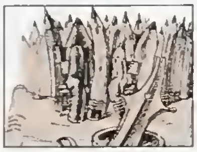

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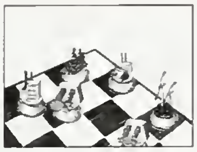

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Oregon Historical Society negative #083566

About the time you receive this issue, the 1989 Supplement to the 1986 Northwest Power Plan will be rolling off the press. If you have requested a copy, expect it by early June. If you have not yet ordered, but would like a copy, call and ask for publication 89-1. Our numbers are on the back cover. Also coming up is the 1989 Draft Annual Report, which is scheduled to be mailed by July 1, 1989. You can request a copy by asking for publication 89-13. We will be taking public comment on the Annual Report from July 3, 1989 through August 4, 1989.

This issue's cover incorporates a rubbing of a bronze sculpture from the elevator doors of the Public Service Building in Portland, Oregon. The sculpture is one of four on the doors, all of which were designed by Portland architect Pietro Belluschi during his apprenticeship in 1926. Our thanks to Pacific Power and Light Company, which occupies the building.

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Looking Toward a New Power Plan

by Dulcy Mahar

The new plan supplement is a beginning, not an end.

This past March, the Northwest Power Planning Council adopted a "supplement" to its 1986 Northwest Power Plan. Although the action culminated more than a year of proposals, public comment and revisions — it was hardly a conclusion. It is, in fact, the beginning of a process that is expected to lead to a new Northwest Power Plan in the early 1990s.

The supplement fills an immediate need by providing a considerably updated forecast of future electricity demand (developed jointly with the Bonneville Power Administration) and data on new resources, so the region will be in a better position to determine which and how much of those resources it needs for the future.

As an official amendment to the 1986 plan, the supplement supersedes the plan in those areas where the two may not agree. However, the supplement is not intended to be a stand-alone document because it deals only with portions of the plan, most particularly the forecasts and resource discussions. Other areas, such as the schedule for introducing new resources and specific actions to take to acquire them, remain unchanged, because they will require a lengthier regional

Illustration by Dan Mandish

discussion. (For a brief overview of which sections of the plan were addressed in the supplement, see box: Major Components of the Power Plan.)

The supplement marks the initiation of a process to determine the most prudent selection and scheduling of new resources for the Northwest to acquire if it is going to meet its growing electricity needs at the lowest cost. The Council anticipates that this process of information gathering, analysis, evaluation and public involvement could lead to a draft power plan that would be released for public comment during the summer of 1990. The exact timing will depend on the complexity of issues and the extent of public comment on preliminary issue papers.

These first steps toward a new 20-year power plan have particular significance because of the tremendous changes going on within the Northwest and throughout the nation — changes that could have profound effects on the electricity system.

The Northwest electricity system truly does seem to be entering a new era. For nearly a decade, the region has both struggled with and enjoyed an electricity surplus.

Given the Northwest's current economic expansion, that surplus is rapidly decreasing — from 2,600 megawatts in 1986 to an estimated 1,000 megawatts by 1990 — and the region is facing the time when it will have to either build or buy new power resources.[1] This presents a whole new set of challenges. The key challenge is how to acquire new power — which is far more

Major Components of the Power Plan

In addition to introductory chapters that include background on the region and information on how the Council carries out its planning, the Northwest Power Plan encompasses four key sections:

Forecast of new electricity demand

This section includes economic, demographic and fuel price assumptions used to estimate how much electricity the Northwest will use over the next 20 years. Based on these assumptions, a range of possible growth patterns for the region's electrical demand is developed. Bounded by high and low, the forecast range also includes medium-high, medium and medium-low. *(This section of the plan was updated in the supplement.)*

Estimates of resource availability and costs

This part of the plan includes all the known information on individual resources — both conservation and generating — and everything that affects these resources, including factors influencing each resource's reliability. Resources have different construction lead times and different life spans. Some also have large up-front costs, then low operating costs, while others have the opposite situation.

To account for these differences, the total costs of a resource (including capital, financing and operating — and inflation if the resource is not to be developed now) are converted into a stream of equal payments — called levelized life-cycle costs — so that all resources can be compared on an equal footing. What it takes to make a resource environmentally acceptable is also included in cost estimates. *(This section of the plan was partially updated in the supplement.)*

The resource portfolio

Using the data it gathers from the preceding evaluations, the Council runs a variety of computer studies to come up with the comparative costs of individual resources and how each interacts with other resources. From there, the Council develops a configuration of the most desirable resources for four of the paths demand for electricity might take: low, medium-low, medium-high and high growth. These configurations graphically illustrate what is known as the "resource portfolio" — actually a schedule for developing resources.

In each configuration, resources will be stacked in a sequence that shows which resources will be developed, in what amounts and when. The guiding principal will be to come up with the configuration that will meet the Northwest's electricity needs at the lowest cost while managing the uncertainties of the future. *(This section of the plan was partially updated in the supplement.)*

The Action Plan

The final key element of the power plan is the list of actions and steps that need to be taken in the near future to realize the overall goals and objectives of the plan: a reliable and adequate electricity supply, development of new resources in a manner that is least costly to the Northwest and the flexibility to adapt to changing conditions with the lowest risk. The Action Plan constitutes a work plan for the Council and the Bonneville Power Administration. It also provides guidelines for the region's utility commissions and the utilities. *(This section of the plan was not addressed in the supplement.)* — DM costly than the existing resources (primarily cheap hydropower)—and keep overall costs to the region and its ratepayers down. Maintaining an economical power supply is critical to the Northwest's economy.

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[1] Energy conservation is considered a power resource in the Northwest Power Plan. The costs to implement conservation programs and measures are calculated so that conservation can be compared on an equitable basis with power generation resources. Currently, conservation is the most cost-effective of all new resources.

Where the previous focus had been on planning for a somewhat distant future, it is rapidly turning to decisions of what to build now. The Council will be looking at individual electricity resources as well as factors that affect them, such as resource delivery systems, regulations that influence or restrict development of resources, arrangements and agreements that affect the power supply, and environmental impacts. (Staff issue papers have already been released on some of these subjects.)

A number of other events reinforce the concept of a new era for the electricity system, both on a regional and national level. Three of the primary agreements that underlay the Northwest's utility system are up for renewal around the turn of the century, and a number of national trends have been shaping up that could change the way utilities acquire resources. (See box: Changing Currents: The Regional Picture, and related story: It May Be a Whole New Energy Game.)

Major conclusions

As the supplement process evolved, three major conclusions emerged, and these conclusions are setting the agenda for the development of the new power plan. The conclusions:

- The region's electricity surplus is substantially smaller than when the 1986 Power Plan was adopted. Action will be required in the near term to meet the region's needs.
- The Action Plan generally appears to contain appropriate activities for the next few years. While most of the Action Plan does not need to be changed, the Bonneville Power Administration and the region's utilities need to move more aggressively to implement these activities to ensure a reliable energy future.

Maintaining an economic power supply is critical to the Northwest's economy.

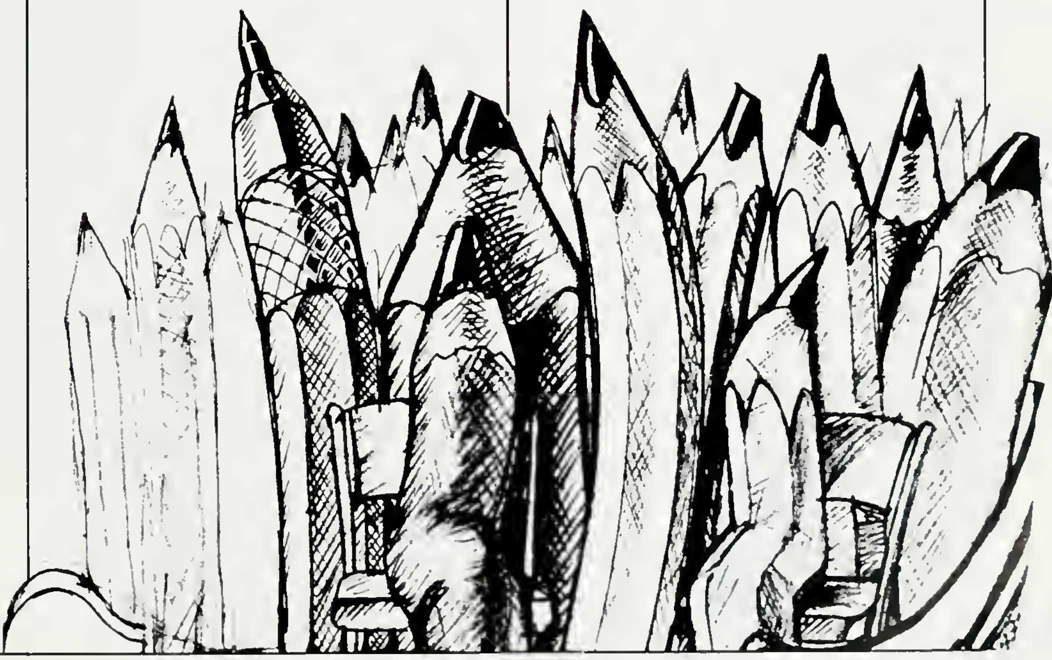
- There are a number of major issues that must be resolved to refine the list of resources for the 1990s. Resolution of these issues will be addressed over the next two years.

A smorgasbord of issues before the region

Taking its cue from the last conclusion above, the Council published a work plan for its power planning division that sets out a proposed agenda for the next several months. The staff will prepare issue papers on key subjects designed to solicit public comment. Advisory committees are being set up to discuss the individual topics. These committees include representatives of utilities, environmental groups, Bonneville and other government agencies, and the general public. The scheduled work falls into five broad categories:

Improve planning techniques

- Work toward developing better computer forecasting models and merging the Council's model with Bonneville's.
- Review the financial and economic assumptions, such as costs for long-term financing and discount rates, used as a basis for determining total resource costs. Resources must be compared on an equal footing to make prudent resource decisions.
- Revise supply functions—the estimates of what amount of a resource is available at what cost. For example, a better way is needed to estimate industrial conservation. It is currently difficult to estimate an average amount of industrial conservation because, unlike the situation with residential and commercial buildings, there are wide differences in how industries use electricity and much of the information on this use is proprietary.
- Seek better information on how much of the conservation resource has been implemented (e.g., percentage of new electrically heated houses built to the Council's conservation standards). Updated information will show up as a reduction



in the demand forecasts.
- Analyze methods of assessing environmental impacts of resources, and look for ways to quantify these impacts in resource costs.

State of the region

- Participate with Bonneville in updating the load forecasts and getting the most accurate and current estimate of electricity surplus/deficit conditions. Special attention will be paid to the load/resource balance of individual utilities in order to develop a more accurate snapshot of the region.
- Evaluate individual utility plans to acquire resources to develop a more accurate regional picture and uncover potential differences in data and analyses.
- Review terms and conditions of interregional power sales to determine their impact on the regional surplus (some will have callback provisions) and to account for power sales and purchases in the assessment of the region's existing resources.
- Develop information and review impacts on power plan of actions to renew or alter major agreements that are due to expire within the 20-year planning period. These include the Columbia Storage Power Exchange, the Pacific Northwest Coordination Agreement and Bonneville's power sales contracts. (See box: Changing Currents: The Regional Picture.)
- Assess the status of the region's research and development of resources. An advisory committee has been established to review research and set priorities.

Changing Currents: The Regional Picture.

Three major agreements, which together underpin the Northwest's hydro-based electricity system, are all due to expire around the turn of the century. It is not premature to begin to explore whether these agreements will continue, and what new terms and conditions might come into play.

First, the agreement between Canada and the United States, which delivers a substantial amount of Canadian-owned power to the Northwest, calls for the return of that power to Canada between 1998 and 2003. This agreement grew out of the Columbia River Treaty, which was signed in 1961, but not ratified until 1964.

As part of the treaty, Canada built three storage dams on its part of the Columbia River, where 30 percent of the streamflow originates, and allowed for construction of Montana's Libby Dam, which backs up water 42 miles into Canada. In return, Canada got half of the added downstream power production. This is called the "Canadian Entitlement." The treaty dams more than doubled the system's storage capacity, improving regulation of streamflows throughout the year and increasing firm power production.

However, Canada didn't have an immediate internal market for its half of the increased power output, so it sold its entitlement under a long-term contract to the Columbia Storage Power Exchange, a non-profit entity formed by several Northwest utilities in response to the treaty. With the expiration of this agreement, the Northwest would return approximately 500 megawatts of energy and 1,300 megawatts of capacity[1] to Canada, starting in the late 1990s.

In a related development, the Pacific Northwest Coordination Agreement of 1964 will end in 2003 unless it is renewed. This agreement governs the operation of most of the Northwest hydropower system, including the seasonal release of stored water by both federal and non-federal hydropower operators in the Columbia River System to obtain the maximum usable energy from the system.

The agreement allows the system to be run efficiently as if it had one owner. It regulates reservoir operation by setting guidelines for maintaining stored water at a level, called the "critical rule curve," below which storage would be insufficient to meet firm (guaranteed) power needs. It also sets the energy content curve, which charts reservoir seasonal levels that determine the amount of storage water available to generate nonfirm (availability depends on snow/rain) energy.

Finally, the Bonneville Power Administration's power sales contracts expire in 2001. These contracts are 20-year agreements between Bonneville and its individual customers (principally utilities and energy-intensive industries). The contracts, which Bonneville was required to offer by the Northwest Power Act, set out the terms for power sales and conditions for power curtailments. —D.M.

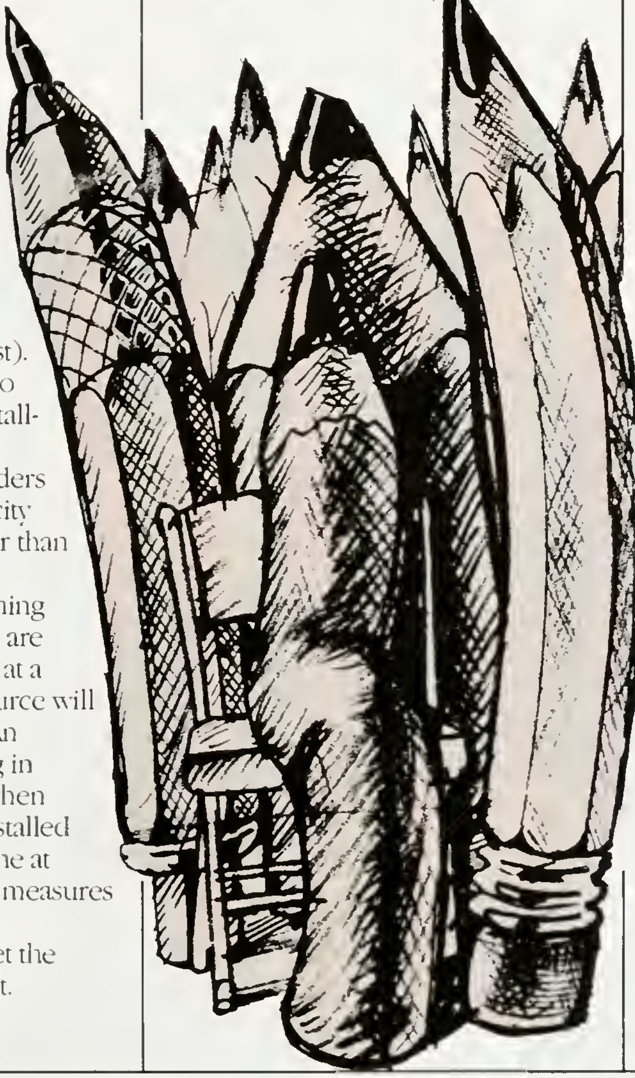
[1] Energy refers to the total megawatts produced over a specific time (usually a year). Capacity refers to the maximum power that can be produced at any given moment.

Influences affecting access to and delivery of resources

- Evaluate bidding schemes to acquire new resources, and look at the experiences other regions have had with bidding processes and their applicability to the Northwest. (See: It May Be a Whole New Energy Game.)
- Assess the impact of the trends toward deregulation within the utility industry including effects on market place competition, transmission and distribution. (See: It May Be a Whole New Energy Game.)
- Analyze regulatory and other existing barriers that discourage utilities from developing their full conservation potential. (See related story: Regulation's Maddening Maze.)
- Evaluate environmental impacts of resources with consideration for new information about non-site-specific impacts, such as global warming.

Conservation resources

- Review existing conservation programs to determine the most effective program designs.
- Examine strategies to reduce electricity losses during transmission and distribution (up to 10 percent of the electricity is lost).
- Evaluate new techniques to conserve electricity by installing equipment to regulate voltage of distribution feeders so that end uses of electricity would not get more power than needed.
- Identify and secure remaining "lost opportunities." These are actions that must be taken at a certain time so that a resource will not be lost to the region. An example would be putting in energy-efficient systems when irrigation equipment is installed or replaced. Unless it's done at installation, energy-saving measures usually won't get added. Thus the opportunity to get the conservation savings is lost.



> A number of events reinforce the concept that it's a new era for the electricity system.

- Re-evaluate discretionary conservation in terms of the declining surplus and determine if any or all of such conservation development should be stepped up. An example of discretionary conservation is weatherization of an existing house. Since it can be done at any time, the failure to weatherize at a particular time does not create a lost opportunity.

Generating resources

- Further assess the costs and availabilities of specific resources, with special emphasis on areas of significant uncertainty: amounts of fossil fuel available, interactions between various fuels, limits to development imposed by environmental considerations and cogeneration availability (a resource where accurate estimates are particularly difficult).
- Continue to explore strategies for and issues surrounding changing the uses of the existing hydropower system. Look at back-up mechanisms that could be used to firm up the additional hydropower available in years where the water level is above a standard called "critical water."
- Examine the potential for renewable energy resources, including an assessment of technological improvements and economics for wind, geothermal, solar, tidal, biomass and other renewable resources.
- Review the cost-effectiveness of alternatives for repowering the steam turbine generators at the Hanford N-reactor to produce electricity.
- Review the status of and uncertainties surrounding two uncompleted nuclear projects in Washington state.

Once the data and public input are gathered and evaluated on these subjects, the Council can propose changes and updates in its resource portfolio and Action Plan. When this work is completed, a draft power plan will be put out for public comment, and hearings will be held in each Northwest state. This won't be the only opportunity for public comment. The Council will take public comment on the series of issue papers that will be released addressing the myriad of individual issues to be considered as part of the new plan development process. ■

It May Be a Whole New

Utilities are considering

by Dulcy Mahar

It has been a lively year for the nation's utility industry, and proposals are taking shape that could permanently alter a number of traditional ways utilities do business. The central questions appear to be — who is going to build the next round of generating resources, and what procedures will be employed to acquire these resources.

The debate is taking place in three arenas: the individual state utility commissions, the U.S. Congress and the Federal Energy Regulatory Commission (FERC). Last year, the Commission issued three notices of proposed rulemaking, none of which is finalized, and it is currently considering a fourth.

The Commission's proposals deal with deregulating independent power producers; the administrative determination of a utility's avoided costs (what the utility would have to pay for a resource it would build if it didn't buy power from an outside producer) and bidding procedures. The latter, which have generated the most discussion, are procedures that allow power suppliers to openly compete to supply power for a utility that needs it. A fourth proposal is expected to deal with transmission.

The traditional model for acquiring new power resources has been for utilities to build their own generating plants. But economies of scale may have reached their limit, and in today's world "big" may not be "better."

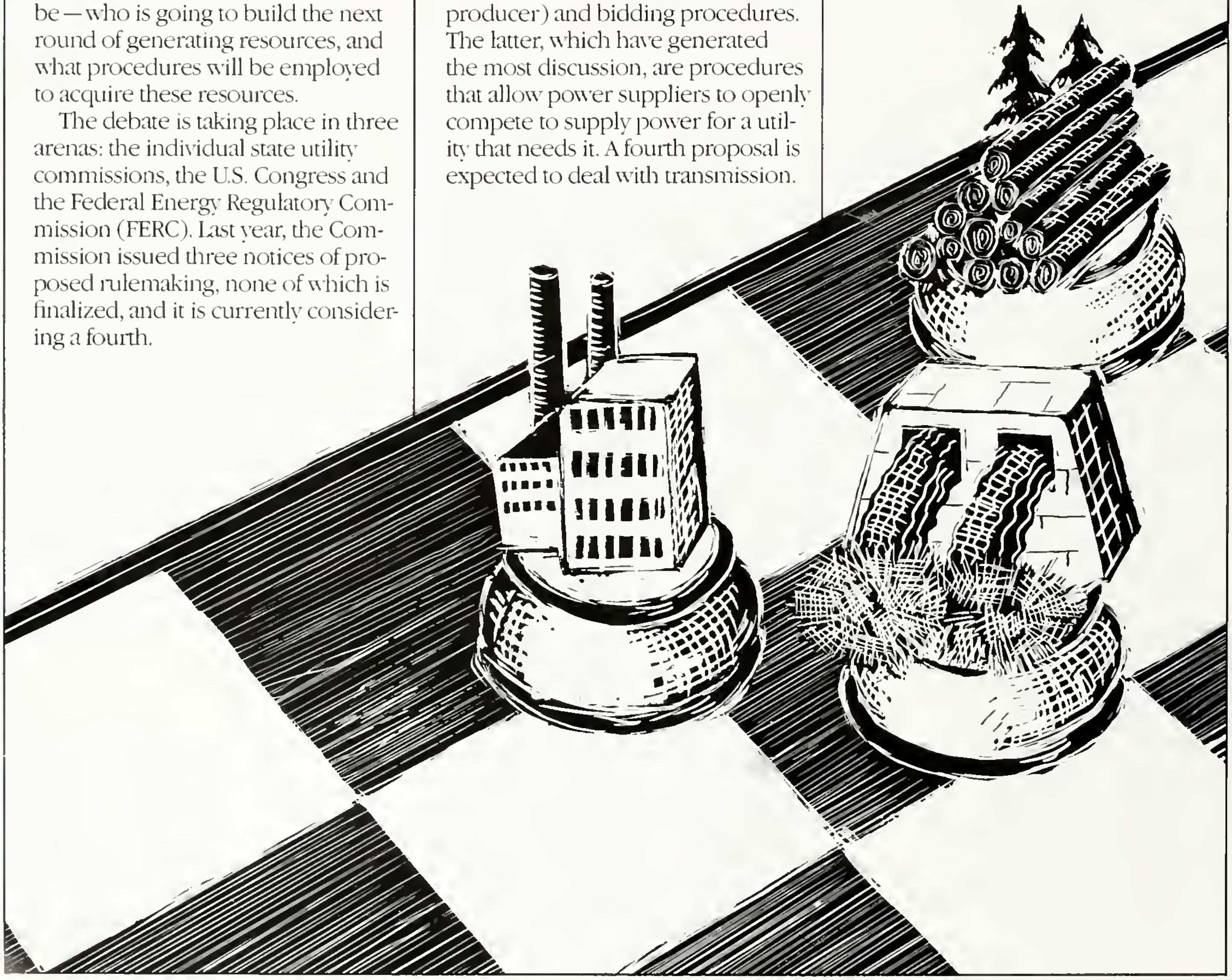


Illustration by Thomas Hardy

Energy Game

new ways of doing business.

From a utility's standpoint, there are enormous risks associated with investing a huge amount of capital in a large, central-station power plant. Many believe that purchasing power in increments from outside sources is the answer. They also believe that greater flexibility (read — less regulation) will be necessary to foster a competitive marketplace.

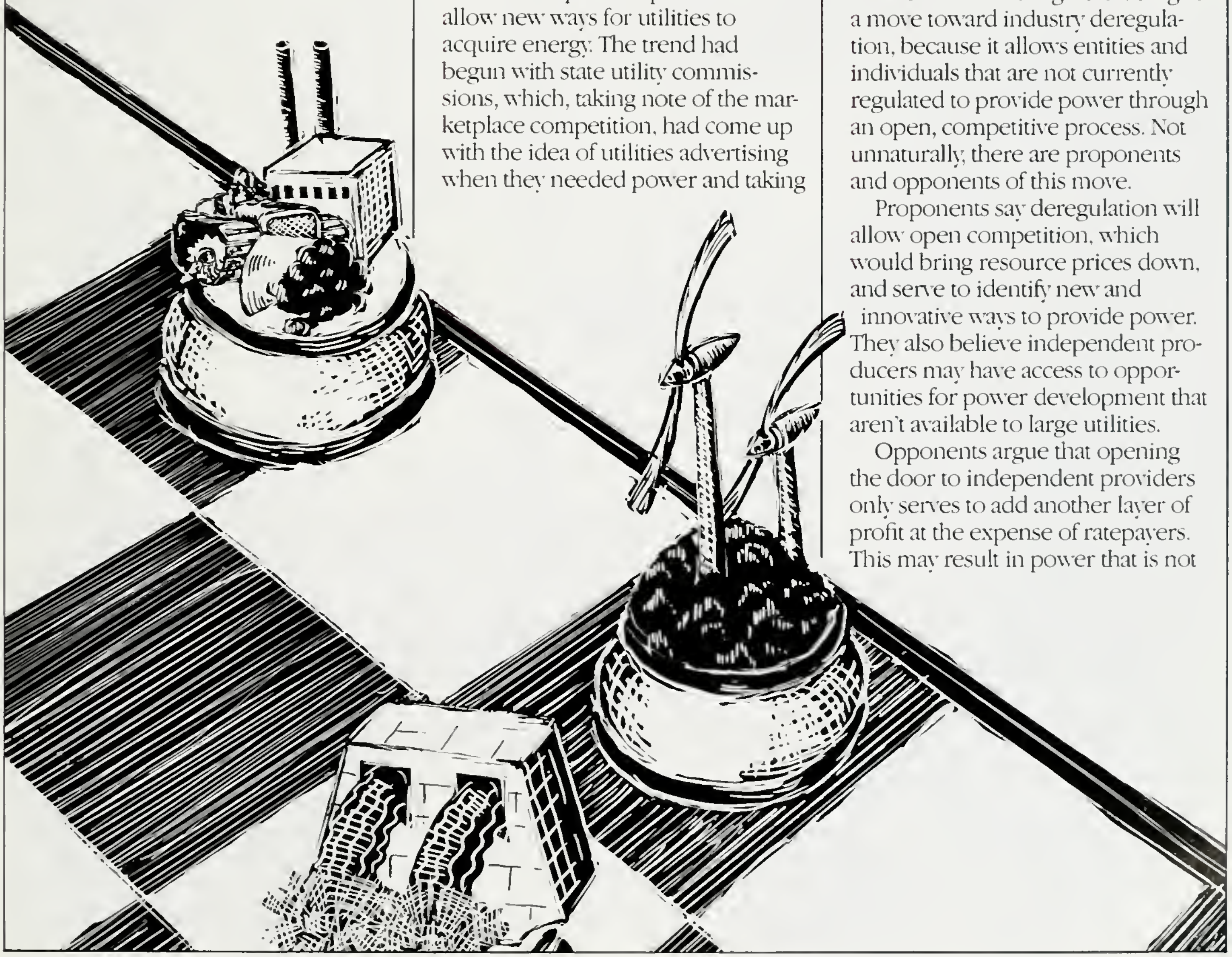
The Commission's proposals are basically designed to open up the resource acquisition process and allow new ways for utilities to acquire energy. The trend had begun with state utility commissions, which, taking note of the marketplace competition, had come up with the idea of utilities advertising when they needed power and taking bids to supply that power.

At last count, 14 states had authorized bidding processes for new resources. (In the Northwest, Washington is considering bidding.) The Commission proposed to institutionalize this process.

Most observers regard bidding as a move toward industry deregulation, because it allows entities and individuals that are not currently regulated to provide power through an open, competitive process. Not unnaturally, there are proponents and opponents of this move.

Proponents say deregulation will allow open competition, which would bring resource prices down, and serve to identify new and innovative ways to provide power. They also believe independent producers may have access to opportunities for power development that aren't available to large utilities.

Opponents argue that opening the door to independent providers only serves to add another layer of profit at the expense of ratepayers. This may result in power that is not



only not cheaper to develop, but also carries an additional charge for the middleman. Some fear that utilities, which have an obligation to serve customer loads, could come to rely too much on non-utility providers who carry no such service obligation.

There is also concern that, while bidding can complement utility plans that ensure adequate energy at the lowest cost, it also could be used by utilities as a substitute for doing so-called least-cost plans.

Creation of these non-traditional delivery systems was spurred by the Public Utility Regulatory Policies Act of 1978 (PURPA), which requires utilities to purchase power from qualified producers at the price the utility would have had to pay to construct its own new generating resource (this is known as the "avoided cost"). PURPA, which came on the heels of the oil embargo and growing national concern for energy independence, was designed to promote development of small-scale renewable resources.

There are at least four methods emerging for delivering power resources in addition to self-generation, which involves no outside sale of power; an industry would simply produce its own power supply.

1. First, there is the traditional delivery system in which a utility builds and operates its own power resource.
2. Under PURPA, entities known as "qualifying facilities" — they produce fewer than 80 megawatts of power from renewable or geothermal resources, biomass and waste, as well as cogeneration (which has no megawatt limit) — have the right to sell power at a utility's avoided cost.
3. Independent power producers are non-utilities that build generation, run it and contract to deliver the power to a utility. They are not limited in size, although typically they produce 150 to 250 megawatts. One of the current FERC proposals would deregulate these entities.
4. A fourth arrangement is where one utility forms a subsidiary and builds resources that it sells to other utilities. PURPA regulations require that the selling utility cannot own more than a 50-percent share in the subsidiary that builds the resources.

These new arrangements have specific relevance to the Northwest, and they could affect the Northwest Power Planning Council's planning process in two ways. First, most of the region's investor-owned (private) utilities have indicated they will not be building their own resources. They expect to rely on non-utility resources that are acquired through bidding.

Second, the Bonneville Power Administration, which supplies most of the public utilities' power, is developing a resource acquisition policy, as called for in the Council's plan. Early indications are that the policy will focus on bidding as one of the major ways for Bonneville to get resources.

The emphasis on how resources are acquired appears to be changing rapidly. This past March, the American Bar Association held its second annual conference on "Electricity Law and Regulation." According to Bob Lohn, chief counsel for the Council, there was a marked change in focus from the preceding year.

"Where one year ago the discussion revolved around whether or not these changes should occur, the discussion this year was on how to implement them," Lohn reported. "The possibility of independent power producers is now widely accepted. The debate is no longer on whether it will come about, but on how it will fit into the utility industry."

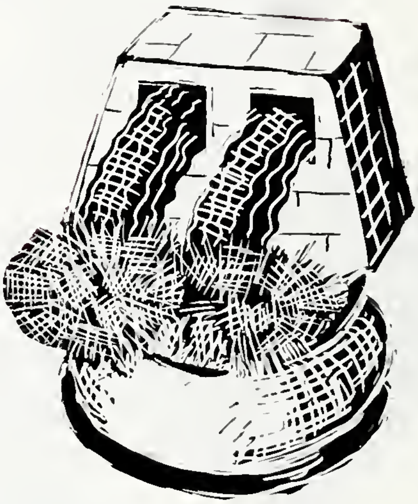
A related issue emerging this year involves transmission, according to Lohn. "If you're going to have power independents, how will they get the power from point A to point B," he said. The Commission is currently working on a notice of proposed rulemaking that is expected to deal with this question.

Still other significant and related changes come in the form of initiatives to alter the Public Utility Holding Company Act of 1935, which limits the ability of utilities to engage in unregulated activities. Currently, there are no independent power producers that operate plants unless they have specific exemptions from the Holding Company Act.

Congress will be reviewing several initiatives to amend the Holding Company Act. The judgments made on these initiatives are expected to address the shape and structure of the entire electricity industry in the United States. The most sweeping change seems to be a shift from relying on utilities building their own power plants toward more dependance on purchased power.

All of these changes are set against the background of a nation whose power needs are growing; indeed, time has run out for some regions such as New England, which is already power deficit.

The Northwest, by comparison, still has a grace period in which to make some decisions, albeit a period that is considerably shorter than that which existed when the 1986 Northwest Power Plan was adopted. If it is to be realistic, the Council's new power plan will have to recognize the sweeping changes taking place on the national, as well as the regional scene. ■



Excerpts from a speech by
Oregon Senator Mark Hatfield
(Delivered March 21, 1989 in
Portland, Oregon.)

Senator Mark Hatfield Speaks at “Power for the West”

Many of us here today have been involved in the issue—"Power for the West"—for over 30 years. I was governor during the signing of the Columbia River Treaty by President Eisenhower and Prime Minister Diefenbaker in January, 1961. Its ratification signaled the beginning of a new era of cooperation and coordination between the United States and Canada, with regard to our water and power resources. Since then, we have been involved in the development and protection of a regional power system, which has been almost singularly responsible for the development of the Northwest economy.

Our hydro-based power system and the Northwest's economy have been under challenge for eight years.

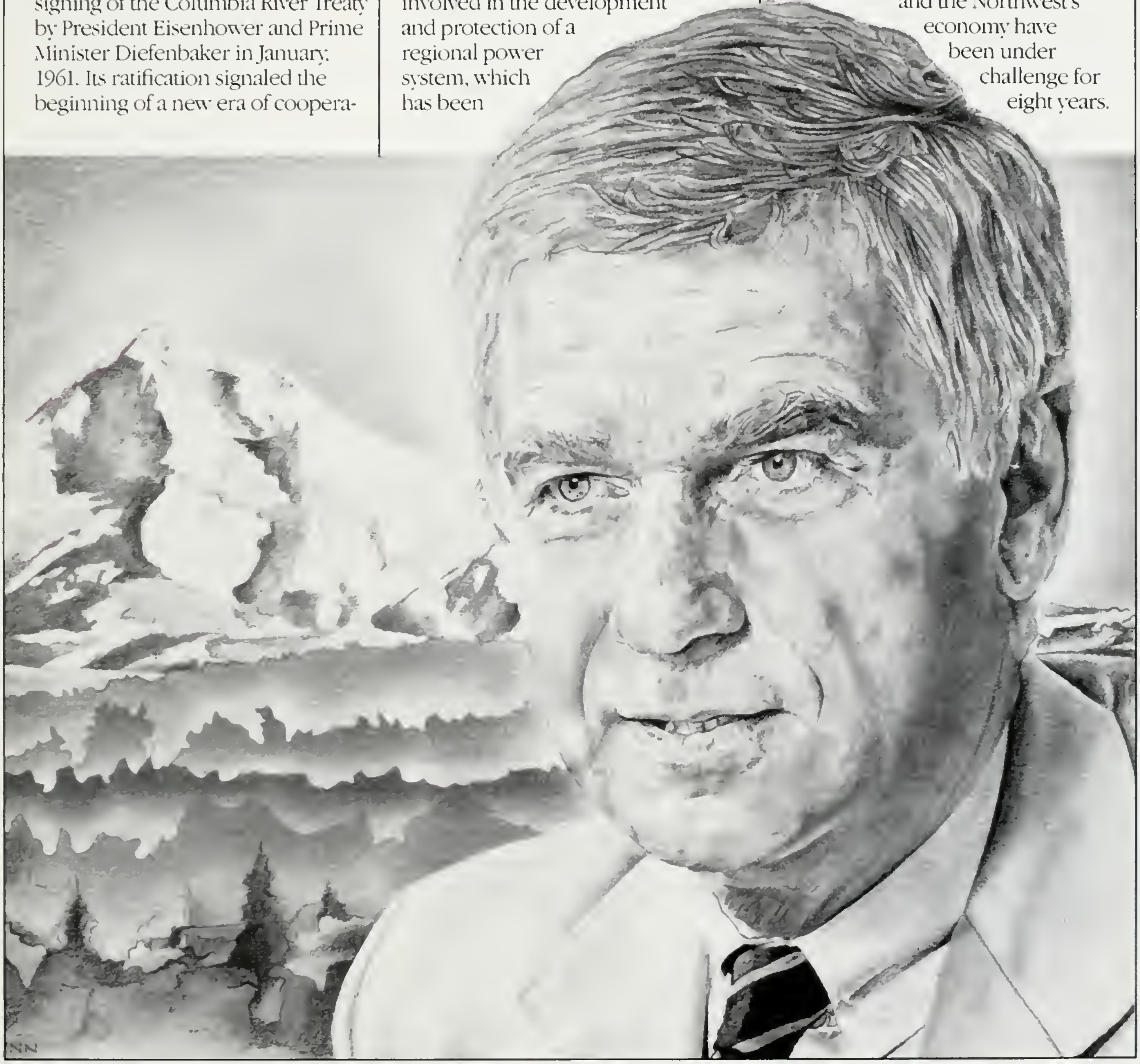


Illustration by Lynn Carson

The conservation resource is in keeping with our inherent responsibility to be just stewards of the natural resources we have inherited and will one day pass on.

Former President Reagan's first budget attempted to deal with the deficit by proposing to sell off capital assets such as the Bonneville Power System.

The eighth and final Reagan budget, which President Bush inherited, again included an attack on BPA [the Bonneville Power Administration] by proposing to increase the repayment schedule, which would result in about a 35-percent wholesale rate boost and threaten the Northwest's slow recovery from a long recession. The idea is nothing short of disastrous; it's like sending an enhanced radiation warhead into our recovering economy in the Northwest. This bomb is aimed at the wrong target.

BPA has maintained regular payments over the last several years and has been a rich source of revenues to the federal treasury. It would be a case of killing the goose that lays the golden eggs.

The repayment rate decision will be made on a basic political level, and the executive branch knows this. Congress simply will not support this proposal. It just isn't going to happen.

We are blessed with a power system that relies primarily on the production, coordination and conservation of renewable resource-based power. We have minimized our reliance on costly alternatives: uranium, coal, oil and gas.

Despite success implementing our regional power strategy, however, we are now at a crossroads in power planning. Not since the Columbia River Treaty was signed, have we faced so many important power planning decisions. Most recent load/resource forecasts indicate that our surplus of electricity is quickly running out. Most forecasts suggest that Bonneville's power surplus will run out before 2003. Given the time it takes to bring new power resources on line, that is practically tomorrow. And given our current consumption patterns and power mix, we are running out of options for supplementing our resources.

In the very near future, we may be faced with the choice between thermal nuclear or coal-generated power to meet future demand. The high cost and potential environmental hazards associated with either of these two power sources are unacceptable. With their incorporation into the power mix, electric rates will increase no matter which path is taken. Can we avoid this choice between the lesser of two evils? Perhaps. By renewing our commitment to conservation, we can buy the time needed to research alternatives.

My strategy for postponing this choice involves a strengthened commitment to a fundamental principle — conservation, the ultimate least-cost option. The conservation resource is in keeping with our inherent responsibility to be just stewards of the natural resources we have inherited and will one day pass on. Unfortunately, we increasingly are turning our backs on that responsibility, using resources today as if there were no tomorrow.

Our commitment to stewardship and conservation must be a function of our inherent responsibility to future generations rather than a function of today's market forces. We are turning our backs on this responsibility by not using our resources wisely.

We have slipped into a throwaway ethic. The average American produces 1,547 pounds of garbage a year — double the West German and Japanese averages.

This throwaway ethic must be replaced with a conservation ethic. Proper conservation will buy us the time necessary to make a determination about the long- term solution to the power needs of the West.

We must immediately set to the task of buying that time. The strategy I suggest could buy us a decade, perhaps even two.

Tremendous gains already have been achieved from residential conservation. We must hold on to those, while getting commercial and industrial users to do more. A recent New York Times article reported that Japan is now 49.1 percent more energy-efficient than the United States. New alloys and technologies in construction, lighting and manufacturing could help commercial and industrial users save between 1,000 and 2,000 megawatts in the Northwest.

Another potential source of additional power is through greater coordination among power providers. Regulated flow agreements between B.C. Hydro and BPA are excellent examples. In managing our power system, we must also be responsible for other natural resources and our environment as a whole. Better coordination of the Columbia Basin dam system will produce increased firm power with no additional investment or lead time. It can save 300 average megawatts.

At this point, let me also express my pleasure with the spill agreement recently negotiated by the BPA. Spilling water over dams to save juvenile fish runs has a tremendous cost in foregone energy generation. By [the U.S. Army Corps of Engineers] installing fish screens, Bonneville will capture an additional $15-20 million in revenue by the mid-1990s.

I might add that, due to current budget constraints, we may in the future need to use BPA's borrowing authority to fund construction of the screens. In my role on the Appropriations Committee, I have been able to help provide funding for these projects, but we should look for a long-term, predictable source of regional funding.

Cooperation between regional power suppliers should not stop with these measures, however. Seasonal-diversity exchange agreements (trading energy between the peak demand seasons of each supplier) could mean enormous energy gains.

In simple terms, we in the Northwest should be trading power when we don't need it, in exchange for power when we do. By increasing cooperation within the West, the region can come out a triple winner—benefiting British Columbia, the Northwest and California. Perhaps as much as 4,000 to 5,000 megawatts can be saved by such agreements.

None of these actions alone will buy us time, nor will a power strategy developed by British Columbia, California or the Northwest acting alone. We must have coordination and a collective commitment. B.C. Hydro must adopt additional conservation, efficiency and least-cost planning strategies within its system.

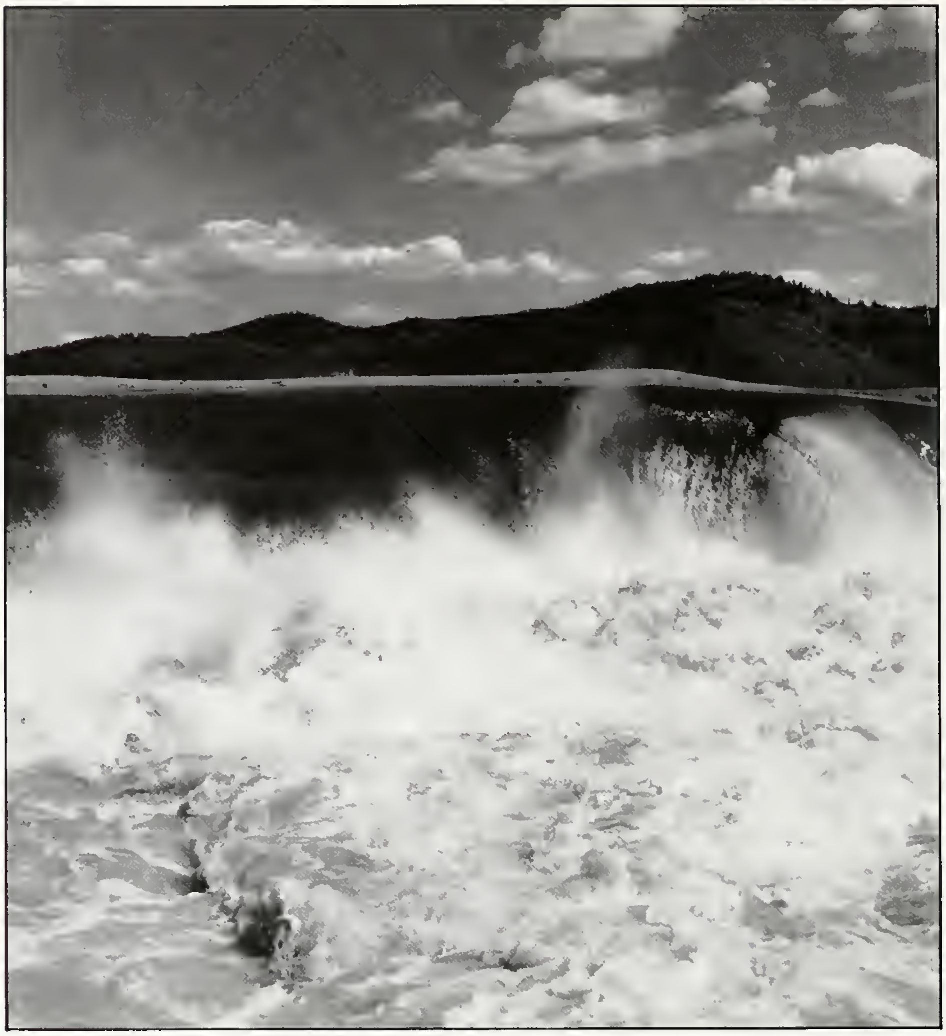
Through direction contained in the Northwest Power Act, Bonneville has been a leader in conservation efforts and in the use of alternative energy sources. But I am concerned that Fiscal Year 1990 underfunds the least-cost path. Bonneville should expand its efforts, particularly in the commercial and industrial sectors. I'm also concerned that the region's investor-owned utilities are shortchanging conservation.

I began by talking about the new era of cooperation and coordination that dawned in 1961 with the signing of the Columbia River Treaty. We must recommit ourselves to that cooperation and coordination.

The decisions we make in the coming months and years will impact our regional power strategy and the development of the West for decades to come. Though I have long been involved in these issues, the impact will extend far beyond my tenure in public office.

But it isn't just me. The implications of your decisions—of our decisions— will have direct bearing on the West we pass on to our children and to their children.

One of America's great statesmen, George Kennan, recently observed: "This civilization we are talking about is not the property of our generation alone. We are not the proprietors of it; we are only the custodians. It is something infinitely greater and more important than we are. It is the whole; we are only a part. It is not our achievement; it is the achievement of others. We did not create it. We inherited it. It was bestowed upon us; and it was bestowed upon us with the implicit obligation to cherish it, to preserve it, to develop it, to pass it on—let us hope improved, but in any case intact—to the others who were supposed to come after us."



Photograph: Bureau of Reclamation

Safeguards for Spring and Summer Migrants

A series of riverwide strategies make salmon journeys safer.

by Ruth L. Curtis

This spring, the final signatures are being gathered on an historic agreement to protect salmon and steelhead at dams in the Columbia and Snake rivers. The agreement was negotiated over the past year and a half by representatives of state and federal fish and wildlife agencies, Indian tribes, utilities, dam operators and the Bonneville Power Administration.

Known as the "long-term spill agreement," it is a plan to spill water at four dams each spring to protect young fish migrating to the ocean. These "spills for fish" provide temporary protection for the young migrants until permanent facilities such as screens are installed.

For eons, young salmon and steelhead have left their homes in a myriad of Northwest streams to ride the currents of the Columbia River system down to the ocean. In the sea, they continue their unique journey, sometimes traveling thousands of miles, feeding as they go. A few years later, when they are mature, those that survive commercial and sport fishers return to the Columbia and fight the currents to return to their home streams to spawn.

As the dams were built across the rivers, this pattern was altered dramatically. The river system was harnessed to prevent the yearly floods from sweeping down the valleys, and to provide electricity and irrigation for growing economies. But the dams turned the river system into an obstacle course. Because of the dams, the annual adult fish runs have declined by at least 5 million under conservative estimates; some believe as many as 11 million fish were lost. (Today's average annual runs are around 2.5 million.)

It has long been known that the dams are barriers for adult fish migrating up the river, and many dams were built with special "ladders" to help the salmon and steelhead negotiate the hurdles. But even more deadly are the impacts dams have on young fish journeying downriver to the ocean. A dam's turbines can kill huge numbers of young fish. The dams have even changed the character of the river system: where once the water flowed freely to the ocean, it is now stored in huge reservoirs. Currents that carried the fish to the ocean have been slowed, and the fish are stalled in reservoirs where they often fall victim to disease or predators.

In recent years, agencies and organizations, guided by the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program, have been working to improve the survival of the fish negotiating the river system — particularly the young migrants. Progress is being made, new agreements are being reached and river operations are changing to take into account the needs of the tiny travelers. Each spring, the obstacles facing the fish are being eased.

The dams turned the river system into an obstacle course.

Fish screens and bypass channels

Young salmon and steelhead are often swept into turbine intakes at dams, and some are killed outright, while others are so stunned that, when they emerge, predators easily catch them. On average, 15 percent of the downstream travelers are killed by turbines at each unscreened dam. The cumulative losses are staggering. Of every 100 fish that start their migration from the Snake River or the upper Columbia River, it is estimated that 55 will be killed by the turbines. To prevent this, many dams are built with screens across the intakes and bypass systems to provide an alternative route for the fish to get past the dam.

One of the highest priorities of the fish and wildlife program is to ensure that all federal dams on salmon migratory routes have screens and bypass systems. In particular, the U.S. Army Corps of Engineers was called upon to construct screens at Lower Monumental and Ice Harbor dams on the Snake River, and John Day and The Dalles dams on the Columbia River.

At the John Day Dam, construction of new screens and bypass systems was completed in the spring of 1987. The new systems have worked well for the spring migrating fish, but for some unknown reason, they have not been successful for the summer migrants. So water laden with young fish is spilled at John Day during the summer. The Corps is proceeding with work at Lower Monumental, and its bypass systems are expected to be operating in time for the 1993 fish passage season. Work at the other two dams is in the design phase.

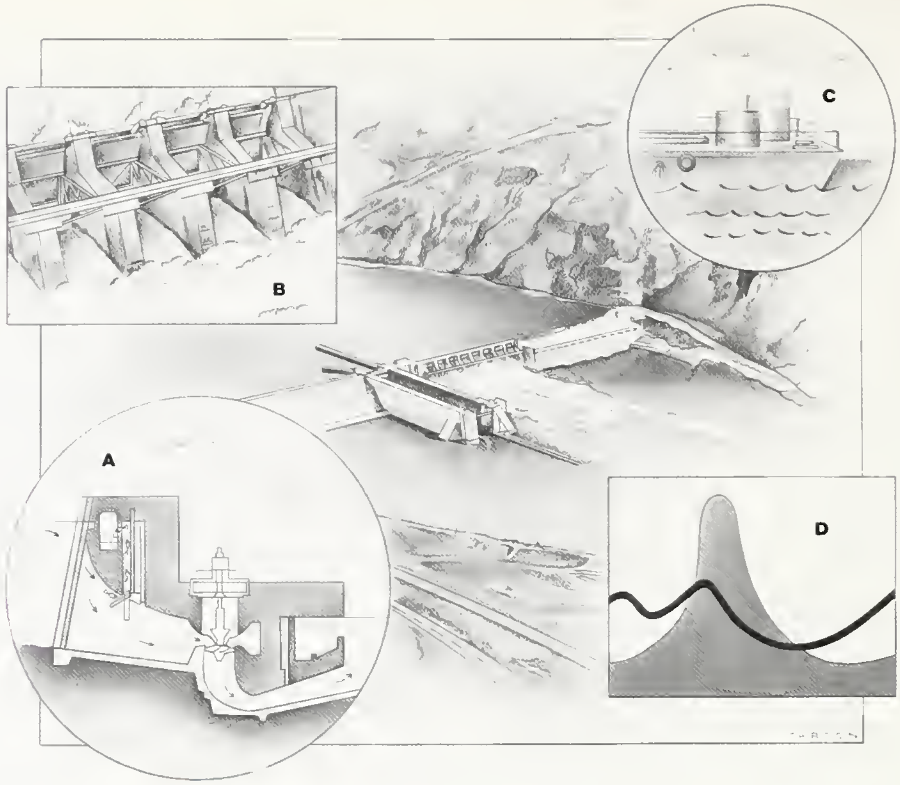
At Bonneville Dam near Portland, Oregon, a second powerhouse was completed in 1982. Although screens and bypass systems were installed at that powerhouse, the dam has had a dismal record for protecting fish. The Corps is studying the problem and attempting to modify the system so it will function as intended. Until functioning screens are in place, spill is used, and the powerhouse is shutdown when young fish are passing.

Fish passage at Bonneville Dam is extremely important because it is the lowest project on the river system, and a majority of the Columbia River system salmon and steelhead must pass it on their way to the ocean.

Spill

Until these passage systems are installed, the Council has called for spill at the dams. Spill involves releasing water through a spillway, pulling young salmon and steelhead along with it so that they avoid the turbines as they pass the dams. Spill is costly in terms of lost revenue for the Northwest electricity system, because it uses water that would otherwise be used to generate electricity. Therefore, it is considered only an interim measure until permanent bypass facilities are installed and functioning properly at the dams.

The Council has called on the Corps of Engineers to achieve at least a 90-percent fish survival rate at each dam by using spill over the middle 80 percent of the spring and summer migrations, regardless of any impacts to the power system. Unfortunately, each year there has been a great deal of conflict about the implementation of spill, frequently centered on this survival standard. In fact, the standard was not met by the Corps at Lower Monumental Dam during the summer of 1988.



Mainstem Passage Strategy

The Columbia River Basin Fish and Wildlife Program emphasizes four means of improving the survival of juvenile salmon and steelhead attempting to migrate past dams in the Columbia and Snake rivers A) Permanent bypass systems to divert young fish from the turbines are being installed at each dam B) Until these are completed, spills of water over the dams will enable juvenile migrants to avoid the turbines C) Certain stocks of salmon and steelhead are also collected and transported around the dams in barges and trucks D) Finally, to speed young fish through the system, a block of water is released in the spring when the dams would normally be storing the water to generate electricity later in the year

Illustration by Lynn Carson

To help settle these disputes, the Council asked the Mainstem Executive Committee, made up of representatives of state and federal fish and wildlife agencies, Indian tribes, the Bonneville Power Administration, the Pacific Northwest Utilities Conference Committee (representing Bonneville's customer groups), the Corps of Engineers, the Bureau of Reclamation and others to work out a settlement for the spill issue.

The negotiations produced the new spill agreement mentioned above—a detailed plan for up to 10 years of spill at the Lower Monumental, Ice Harbor, John Day and The Dalles dams—all operated by the Corps of Engineers. (As this issue went to press, the agreement was being distributed among the groups involved for signatures.) But last February, because the spring migration season was rapidly approaching, the Council, approved the agreement's spill standards for the 1989 season only. The entire agreement is scheduled for adoption when all the necessary signatures are collected.

"This agreement makes sense for fish and it makes sense for power," Jack Robertson, deputy administrator at the Bonneville Power Administration told the Council. "It is a negotiated agreement—so no one got everything they wanted, but everyone got enough."

Mid-Columbia dams

Work is proceeding at the five public utility district dams in the mid-Columbia River in central Washington, to improve their fish passage facilities. The Council called for these improvements in 1982. The utilities agreed to the improvements as part of the conditions imposed by the Federal Energy Regulatory Commission for renewing their dam operating licenses.

Douglas County Public Utility District has installed an improved fish bypass system at Wells Dam, which will be in full operation this spring for the first time. New screens are being studied for Rock Island and Rocky Reach dams, while at Wanapum and Priest Rapids, other bypass options are being considered, including transporting the fish in barges around the dams or moving them in a long flume (a prototype is being tested this year). While these options are studied, spill is being provided to protect the young fish.

Transportation

Another way of helping fish avoid the dams is transportation in barges or trucks. With transportation, fish are collected at Lower Granite or Little Goose dams on the Snake River or McNary Dam on the Columbia River and hauled nearly 300 miles to just below Bonneville Dam (a two-day trip). This is an effective means of moving some fish downstream. However, not all fish in the river can be collected, and transportation's effectiveness for spring chinook is questioned because of low survival rates.

The Council agreed with and helped obtain funds for a Corps of Engineers' proposed expansion of fish holding facilities at Lower Granite, Little Goose and McNary dams to facilitate the transportation of fish. Lower Granite's collecting and holding facilities were expanded in 1983. Little Goose's facilities, including a new system for loading fish, will be ready for next spring's migrations, while McNary's will be completed by 1994.

The Corps began operating two new barges this spring, bringing its present fish transportation fleet to six barges.

Last year, the Corps transported over 20 million fish, a record number in the 11-year history of the program. John McKern, the Corps' coordinator of the juvenile fish transportation program, expects the numbers of salmon and steelhead transported to increase dramatically in the next few years because of improved wild spawning success and hatchery production. "The Corps is expanding facilities and upgrading equipment to collect and transport 40-50 million fish per year, depending on collection efficiencies, and the desires of the fishery agencies and tribes responsible for management of these resources," he reports.

The water budget

In addition to the physical barriers presented by dams, there are other problems. The reservoirs behind the dams have turned the river system into a series of lakes, altering its natural flow. The spring runoff once quickly flushed the fish to the ocean; now it is stored to generate power in the fall and winter. The fish's journey to the ocean now takes longer — affecting the ability of the juvenile salmon to make the transition from freshwater to saltwater.

This slower current also increases the fish's exposure to predatory fish and birds and, by raising water temperatures and altering water chemistry, increases the fish's susceptibility to disease.

The water budget is the Council's solution to these problems. Often confused with spill, the water budget is very different. It is not water spilled over dams, but a specific amount of water used to wash the fish down to the ocean. While spill helps fish get past dams, the water budget helps them travel between dams.

> Increased coordination with Canada to produce more electricity might affect flows and, hence, fish in the river.

A predetermined 3.45 million acre-feet of water in the upper Columbia and 1.19 million acre-feet in the Snake River (an acre-foot is 1 acre of water, 1 foot deep or 325,850 gallons) are used during the height of the fish migration (between April 15 and June 15) to artificially increase the rivers' flows, imitating the natural spring runoff. This speeds the young fish to the ocean.

The water budget has only been operating since 1983, and it is difficult to assess its success. According to Rick Applegate, director of the Council's fish and wildlife division, "There are storm clouds appearing on the horizon for the water budget. There has always been discussion of whether the budget should be a block of water or a specified flow level, and with the recent low water years, these concerns are being raised again."

Concern also has risen about the Bonneville Power Administration's recent efforts to coordinate more closely with Canada the use of 3 million acre-feet of water storage at Mica Dam in Canada. This increased coordination to produce more electricity might affect flows and, hence, fish in the river. It is likely that the Mainstem Executive Committee will be asked to deal with these water budget and Canadian storage concerns.

Vernita Bar

One program that seems to be a success in the Columbia River system is the assurance of flows at the Vernita Bar to protect the spawning, incubation and emergence of fall chinook salmon. Vernita Bar is located immediately below Priest Rapids Dam, near the Tri-Cities in Washington. It is the last remaining major spawning ground in the Columbia River for fall chinook, known as the upriver brights.

According to Jim Ruff, Council hydrologist, "for several years, Bonneville, on an informal basis, has assisted in ensuring that a minimum level of flows was provided over the bar." Then in 1988, the settlement of a long-standing dispute over Vernita Bar flows required Grant County Public Utility District, in cooperation with Bonneville and other parties, to provide the flows. The result has been that upriver brights have been doing very well in recent years.

The success at Vernita underlines the hope that, while the Columbia will never again be a free-flowing river, it can still become a safer course for the fish migrating out each year. ■

REGULATION'S *MADDENING MAZE*

How Northwest electric rates discourage conservation.

by Gordon Lee

Regulatory practices in the Northwest and across the United States can discourage utilities from aggressively pursuing conservation measures, a Northwest Power Planning Council staff analysis concludes.

Current regulatory and rate-setting practices favor electricity sales over conservation or energy-efficiency measures. That's because traditional rate structures allow profits for investor-owned utilities based on their revenues. Any steps that reduce electricity sales — such as conservation — cut revenues, and thereby eat into utilities' net profits.

However, many utility regulators are considering new ways of looking at conservation that offer utilities incentives to make energy-saving investments. Regulators across the country are reconsidering assumptions they've used to set electric rates, assumptions that have favored spending on new plants and equipment and on cost-reduction efforts rather than on energy-saving steps. Some of the most innovative regulatory proposals try to uncouple utilities' earnings from the amount of power they sell, give them extra returns and tax credits for conservation expenditures or reward utilities for reducing customers' bills.

In Washington, for example, regulators this year intend to review the state's electric rate setting practices, which sometimes work against utilities that see revenues drop as a result of conservation measures. "We'll be looking at innovative ways to treat conservation-lost revenues," notes Steve Aos, who is in charge of policy analysis at the Washington State Utilities and Transportation Commission.

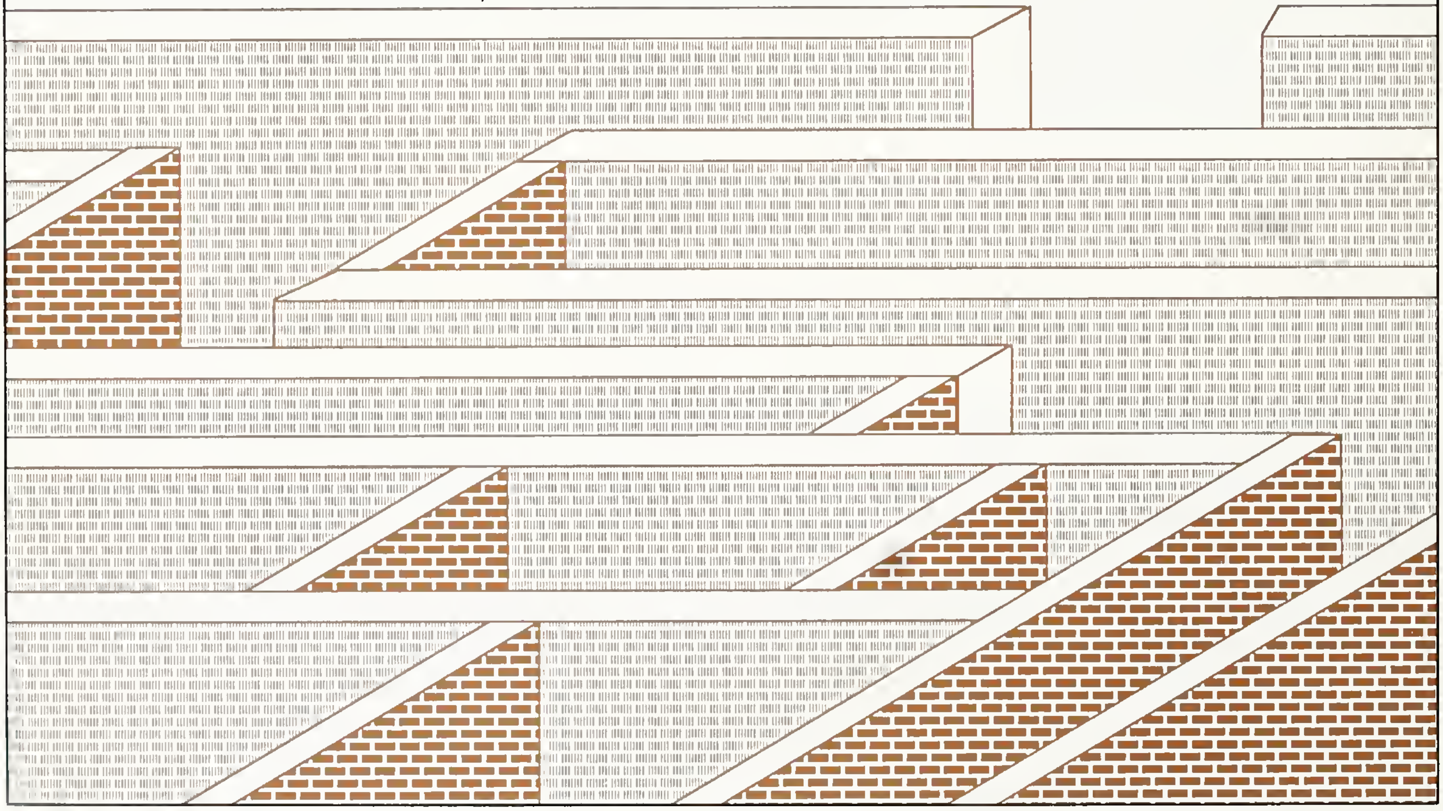


Illustration by Stephen Sasser

Any steps that reduce electricity sales— such as conservation — cut revenues.

Such regulatory changes could play a key role in helping utilities meet the Northwest's energy needs over the next 20 years at the lowest cost. That's because conservation is the region's least-costly source of energy and has been the preferred resource in the Council's recommended energy mix for the Northwest since 1983. It is inexpensive, compared with alternative new power sources. It is environmentally benign. It is relatively easy to implement. And its impact can grow as demand for electricity increases.

Moreover, conservation is an abundant resource. Throughout the region, utilities could conserve 2,600 average megawatts over the next 20 years, under conditions of high energy demand. That's enough energy to replace almost six large coal plants. But electricity obtained through conservation would cost only 2.4 cents a kilowatt-hour, half the price of power generated from a new coal plant. Without conservation, the region would have to spend an extra $6 billion over the next 30 years to meet demand under high-growth conditions.

However, while conservation's potential is high, current regulatory attitudes restrict its attractiveness to investor-owned utilities, whose rates and resource choices must be approved by state regulators. Utility experts aren't sure how much power these so-called "regulatory barriers" cost the region. But they argue that the Northwest and the nation likely would save thousands of kilowatts if utility commissions judged conservation differently, giving utilities incentives to save energy and shave customers' electric bills. That could postpone the day utilities will have to turn to expen-

Northwest Rates and Conservation, a Scorecard

Each of the four Northwest state utility commissions treats electrical energy conservation differently. Here's a rundown of their current practices:

• Idaho

The Idaho Public Utilities Commission in a recent order strongly supported utilities' turning to conservation for new sources of power. The order says the commission will allow utilities higher rates of return on efforts to plug into conservation. That includes so-called lost-opportunity resources — in this case, sources of energy savings utilities obtain by getting builders to construct energy-efficient new homes and offices.

In the past, Idaho has allowed utilities to receive a return on some of their conservation expenditures, allowing them over 20 or 30 years to get back the money they spent plus interest, and to recover in one year other investments dollar for dollar. The new order, however, allows utilities to get a return on all their conservation investments.

• Montana

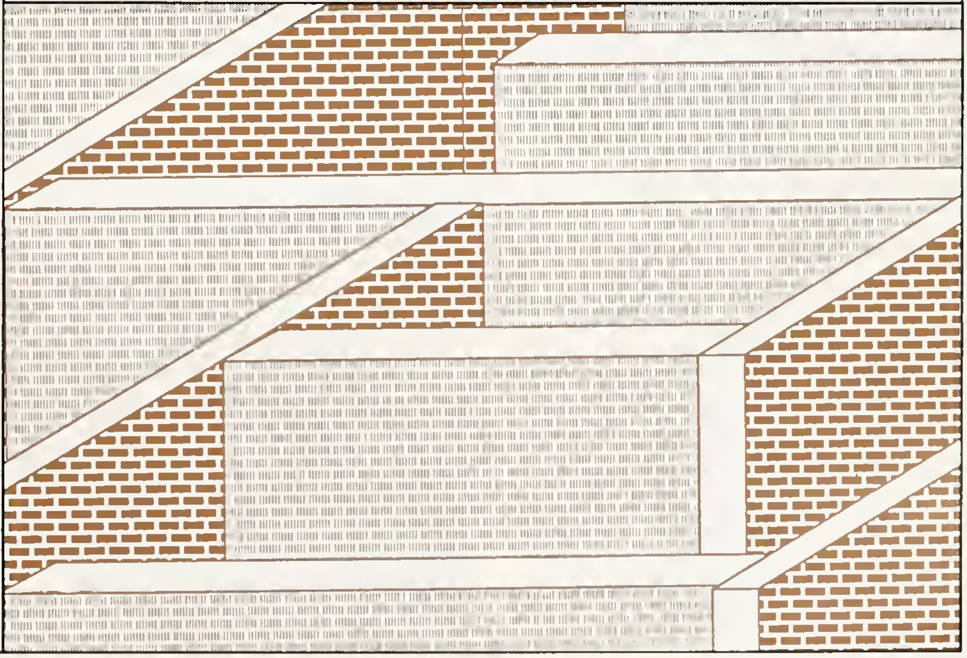
State regulations allow the Public Service Commission to grant 2-percent higher returns on conservation investments than on other utility investments. It also allows utilities to earn a return on their conservation costs through rates over 30 years.

• Oregon

The Oregon Public Utilities Commission allows utilities to earn a return on approved conservation expenditures. However, some generalized conservation spending, such as administration costs, aren't allowed to earn a return.

• Washington

The state Utilities and Transportation Commission allows utilities to earn a return on conservation expenditures and permits one company — Puget Sound Power and Light — to adjust rates automatically between rate hearings. It also allows utilities to earn a 2-percent higher return on conservation expenditures than on other resource spending. — G.L.



sive new sources of energy to meet growing electricity loads in Idaho, Montana, Oregon and Washington.

"The problem is the inherent unprofitability of successful conservation programs," notes Ralph Cavanagh, a senior staff attorney at the Natural Resources Defense Council in San Francisco and director of its Northwest Energy Project. "A successful conservation manager is costing utilities income."

Regulation of utility rates has as its foundation the notion of a fair rate of return. That's a level of profit that state utility commissions allow utilities to build into rates, based on their need to maintain service to customers, pay adequate dividends to shareholders and interest to bondholders, and maintain and expand plants and equipment. Part of the rate of return thus covers fixed costs, such as bond payments, and part covers a return on shareholder equity, which is a cost that isn't contractually fixed. Utilities aren't guaranteed they'll earn that return any given year; they're simply given the opportunity to do so.

State regulators traditionally have determined rates for a given period by dividing a utility's allowed or approved costs, often termed revenue requirements, by the amount of power it expects to sell during that time. The result is an amount the utility can charge per kilowatt-hour.

Rate setting looks to the future. Rates aren't designed to account for unexpectedly high or low earnings in past years. Rather, rates are supposed to reflect what a utility expects its costs will be over the coming years.

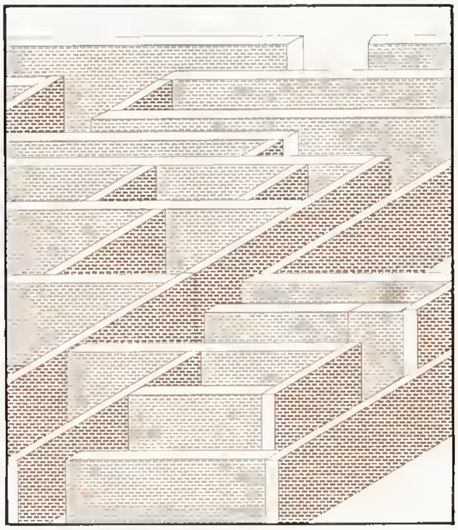
This traditional rate-regulation structure contains several incentives that work against conservation. On the one hand, the structure encourages utilities to build capital assets rather than contract for services. That's because regulators allow only capital investments included in rate bases to receive a return. Regular expenses and contractual payments are recovered dollar for dollar out of rates. As a result, utility stockholders get no return on non-capital expenditures.

Traditional regulation pushes utilities to trim costs or to sell more kilowatt-hours, not to promote energy efficiency.

At the same time, traditional regulation pushes utilities to trim costs or to sell more kilowatt-hours, not to promote energy efficiency. Once rates are set, utilities can increase short-term returns to shareholders by selling more power than they had predicted or by cutting expenses. In such an environment, efforts to get customers to use less electricity work in the opposite direction, shaving rather than enhancing profits.

"To the extent that the incentive to build operates, it reinforces the incentive to sell by justifying building," notes Wally Gibson, manager of system analysis and rates at the Council.

Those incentives are most apparent during periods of energy surplus, such as the one that has dominated the Northwest for the past decade. With more power to sell than customers demand, utilities can encourage new energy use without incurring substantially higher costs. "The problem is that profits come from selling, not conserving," notes Cavanagh. "At the margin, sales are very profitable. The extra kilowatt-hours utilities sell are very profitable. [With conservation] utilities may be able to recover costs, but what they can't get back are the marginal profits."



But with the prospect that the Northwest's electricity surplus could disappear as early as the mid-1990s, utility experts say the time is right to consider regulatory practices that offer incentives for conservation. In California, for example, the Public Utilities Commission has put into practice regulations that attempt to separate utility revenues from kilowatt-hour sales. Known as an Electric Revenue Adjustment Mechanism (ERAM), this aspect of the state's rate structure looks at a utility's actual and forecast revenues and adjusts rates in succeeding periods based on under- or over-collections. This insulates utility earnings from drops due to conservation or unexpected weather.

"This decouples profits from sales of kilowatt-hours," says Cavanagh, one of the new mechanism's architects. "I'm not talking about guaranteeing profits to utilities."

California's revenue adjustment allows utilities that see revenues fall after they inaugurate conservation programs to recoup those losses by raising their electric rates in later periods.

However, not every utility will take advantage of that flexibility. Pacific Power and Light Company, for example, which has service territories in northern California, has had a mixed experience with the new mechanism. The company recently has been given the authority under the revenue adjustment mechanism to raise its rates, but it's not likely to exercise that option under current market conditions. "We're pledged to rate stability," says John Shue, director of energy efficiency at the Portland-based utility that serves 670,000 customers in Oregon, Washington, Idaho, Montana, Wyoming and California. "In a competitive market, we can't raise rates."

For utilities such as Pacific, which predicts that the utility industry will become increasingly competitive and volatile and that large customers may find new sources of power if prices climb too high, this kind of revenue adjusting isn't an incentive to enter into conservation.

At the same time, some critics fear that the existence of the California mechanism may make utilities less vigilant about controlling costs and keeping a lid on rates, since the adjustment clause guarantees that costs will be recovered. As a result of these and other worries, the California commission's Division of Ratepayer Advocates wants to scrap the revenue adjustment mechanism, and the commission is looking into the issue as part of a larger investigation into revising its approach to utilities' returns, risks and rates.

Other states, notably Washington, allow utilities to earn higher returns on investments they've made in conservation measures than on other investments. In Washington, that bonus amounts to a 2-percent higher return on conservation investments.

However, critics worry that unless this bonus applies to non-capital expenditures, utilities will have little incentive to spend money on education programs or on marketing conservation. Regulators typically allow utilities only to recover the direct costs of non-capital expenditures, Gibson notes. Capital expenditures, on the other hand, can be depreciated over their lives and earn a return.

Moreover, Washington's approach could lead utilities to invest in inefficient or expensive conservation measures. "This is because the amount of the extra return earned is a function of the amount of invested capital, while the lost revenue is minimized by choosing a program that saves little energy," Gibson says. "The issue of gold-plating utility investments is one that is potentially raised by all utility investment and has long been a subject of academic discussions. It is only slightly magnified by the extra return offered by conservation investments."

Some observers of utility regulation say that the California and Washington approaches are band-aids, and don't address the fundamental problem of incentives. As long as rates and returns still are based in some fashion on kilowatt sales, utilities will have a tough time urging customers to use less electricity.

But David Moskovitz, a commissioner on the Maine Public Utilities Commission, proposes a way out of that circle. He suggests that utilities that have been most successful in lowering customers' bills be given the highest rates of return on all their assets. That focus on bills rather than rates acts as an incentive to conservation, he argues. Utilities would be rewarded equally for conservation or generation resources, assuming they have the same cost.

The time is right to consider regulatory practices that offer incentives for conservation.

Unlike California's approach, which acts to preserve a utility's earnings as it pursues conservation, "Moskovitz's proposal would actually increase the utility's earnings to the extent the utility followed least-cost principles," Gibson says. "This would mean that the utility stockholders and ratepayers would share in the benefits of any cost reductions due to conservation being lower cost, rather than the ratepayers keeping them all."

Moskovitz's proposal is new, and the Maine commission hasn't decided whether to test it.

However, at least one Northwest utility says the proposal is better suited for the structured and segmented market on the East Coast than for the highly competitive, potentially deregulated electricity market in the West. "Lots of things make sense for utilities that don't face deregulation and don't face lots of competition," says Pacific Power's Shue. "The proposal says you can benefit from talking people out of using electricity."

Since conservation is a key resource in its Northwest Power Plan, the Council will explore these and other proposals over the next few months. The Council recognizes that state regulatory practices play a large role in the implementation of that plan. Only when it can identify the extent to which regulatory barriers discourage investor-owned utilities from actively pursuing conservation will the Council be able to recommend the most appropriate ways to overcome those obstacles. ■

A BRIEF HISTORY OF LIFE IN SYNTHETIC STREAMS

Illustration by Joan Barbour

An Overview of the Northwest's Salmon and Steelhead Hatcheries

by Carlotta Collette

Springtime in the Columbia River Basin sees the first of nearly 200 million tiny salmon and steelhead pouring out of concrete troughs, called raceways, to enter streams and rivers enroute to the sea. The fish are only inches long at this stage. They have been artificially spawned, hatched and reared in the constructed environment of hatcheries. And fewer than 1 percent of them will survive their outmigration and life in the ocean. Their chance of survival is influenced by how far up the Columbia they are when they are released.

Nonetheless, even at 1 percent—or about two million fish—they amount to about 70 percent of the adult salmon and steelhead from the Columbia River Basin. Only about 30 percent of this basin's sea-run fish naturally reproduce in graveled streams.

Many fishery experts in the Northwest are aware of and at home with this "balance." For them, hatcheries are considered the most efficient means of providing the raw material of an important industry. The first Columbia Basin hatcheries were actually begun by operators of salmon canneries worried that their resource was dwindling.

But others argue that so enormous a dependence on unnatural systems is dangerous. They contend that hatcheries are overrated, that they jeopardize the genetic diversity considered necessary to the long-term sustainability of fish runs, and foster diseases that could threaten all salmon and steelhead.

Still, even those who loudly defend wild runs of salmon and steelhead recognize that some balance of natural and hatchery production is needed. The difficult question is, where should the balance be struck.

Recent legislation in California calls for a program to help double that state's current natural production of anadromous fish (primarily salmon and steelhead). "Reliance upon hatchery production of salmon and steelhead trout in California is at or near the maximum percentage that it should occupy in the mix of natural and artificial hatchery production in the state," reads the legislation. California produces only about half its salmon and steelhead in hatcheries.

If the Northwest is to increase its salmon and steelhead populations to approximately double the current combined natural and artificial production level—the hope of the

Northwest Power Planning Council and one goal of the Columbia River Basin Fish and Wildlife Program — it will likely require new hatcheries. Even if every available basin stream is brought close to full natural production potential, hatchery releases could still be needed. Plans are already under way for four new salmon and steelhead production facilities in the basin. More hatchery proposals are expected from the current endeavor to quantify production potentials and methods in 31 subbasins of the Columbia.

Before any of these is approved for construction, the Council requires that a master plan be drawn up. These plans must describe proposed management policies and practices and detail production profiles that ensure maintenance of genetic integrity in native fish. They must also provide descriptions of release sites and harvest schemes for stock produced in hatcheries but released into streams away from the production facility. Finally, the plans need to include strategies for ongoing biological monitoring and evaluations to track the effectiveness of the project.

Science aids production

The intent of such elaborate planning is to encourage a more considered approach to hatchery operations basinwide. There is no question that the management of fish production has improved greatly in the 110 years that salmon and steelhead hatcheries have been functioning in the basin. Early Northwest hatcheries were all but abandoned in the 1930s, because returns were so negligible. Canada terminated all hatchery production of salmon and steelhead in 1936, after concluding that the synthetic environment didn't produce sufficient returns to warrant the investment. (Hatchery production has since been reintroduced in that nation.)

Only about 30 percent of this basin's sea-run fish naturally reproduce in graveled streams.

A big part of the problem was a lack of understanding of salmon biology. Around the turn of the century, hatcheries were turning fish out to fend for themselves soon after they were hatched. Experts figure that few of the 60 or more million fingerlings set into streams in those days survived this abrupt transition.

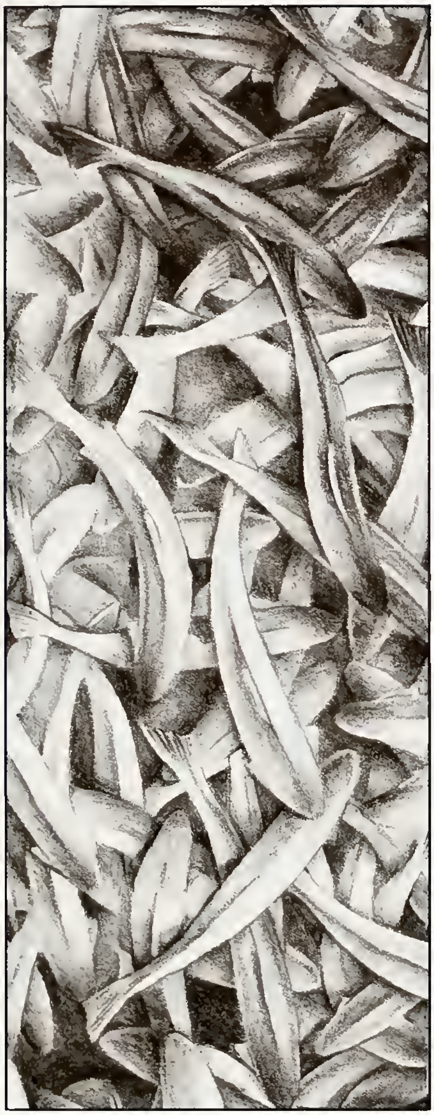
After some trial and error, it was learned that survival rates could be dramatically improved by feeding the tiny fish for some time before releasing them. Unfortunately, little was known about their nutritional needs. They were primarily fed ground fish and animal carcasses, which, it was much later discovered, tended to spread diseases. Furthermore, it was not until the 1960s that the necessity of vitamins, minerals and antioxidants (a form of preservative) to fish health was understood.

With the invention of pelleted feeds and vitamin fortifications, fish producers were able to serve protein, mineral, vitamin, fat and fiber combinations that specifically nurture young salmonids. As a result, hatchery efficiencies have improved markedly.

Fish propagators have also learned much about the role of water quality and rearing densities in fish health. And research into new fish marking techniques enabled scientists to track juveniles through the river system and make distinctions among returning adults. Such tracking has helped hatchery managers more precisely time fish releases to optimize smolt-to-adult survival.

The limits of science?

But after a few decades of significant increases in survival rates of hatchery-released salmon and steelhead, the numbers from some facilities appear to be declining. The cause of this downturn is unknown. Some scientists point to continuing disease problems in basin hatch-



eries, which may have led to a concentration of fish pathogens in some populations. Others postulate that poor ocean conditions or the possibility that the estuary and ocean have reached their practical limits for nurturing salmon and steelhead (known as the "carrying capacity") are contributing to the reduced returns.

Still other fisheries biologists question whether the inherent resilience of wild salmon stocks has been "diluted" by inbreeding and the practice of seeding natural streams with hatchery fish without accounting for possible genetic risks. Certainty on these genetics issues is difficult to achieve, but enough is known to raise the level of concern.

In salmon and steelhead, genes are the "pieces" of biological information that enable the fish to adapt to particular conditions, such as water temperatures and quality, length of migratory routes and infections. Genetic diversity is the combination of traits inherited by a given population, as in a specific river reach. The more diversity, the more likely it is that at least some fish will survive adverse circumstances. Stocks with little genetic diversity may lack particular survival characteristics and be unable to adapt to changing environments.

Within the Columbia River Basin, there are numerous genetically distinct stocks. Many scientists reason that the future of the basin's salmon and steelhead may depend on traits that could be lost if some of these stocks are pushed to extinction, or if their survival characteristics are weakened through crosses with hatchery-raised fish that do not match them genetically. This concern has led the Council to include in its program an emphasis on assessing the genetic risks of production efforts before actions are taken. This is especially true for those cases where hatchery-produced fish will be set out in natural streams to help rebuild runs in those areas.

Stemming deterioration

Another possible culprit in the declining survival of hatchery fish might be the age and condition of many of the basin's hatcheries. Some of them date back to the turn of the century. These were expanded and modernized when nearly all of the remaining hatcheries and related facilities (a total of nearly 100 exist in the basin) were constructed as compensation for the fish losses caused by hydropower development. But the vast majority of the Northwest's hatcheries have suffered from limited budgets that stymie fishery managers' efforts to maintain and improve decades-old structures and systems.

> Early Northwest hatcheries were all but abandoned in the 1930s, because returns were so negligible.

The boom period for this construction occurred in the 1940s and '50s, triggered by Congress' passing the Mitchell Act of 1938. The Mitchell Act came three years after Congress approved the River and Harbors Act, which officially kicked off federal dam building on the Columbia (construction had actually begun two years earlier on Bonneville and Grand Coulee dams). Congress was already certain that the dams would seriously threaten fish runs on the Columbia, and the Mitchell Act was intended as a balm to compensate for some of the anticipated losses.

These hatcheries — a total of 25 were authorized under the Act — are currently funded through the National Marine Fisheries Service and operated by the states of Oregon and Washington, and the U.S. Fish and Wildlife Service. Over the past few years, they've accumulated an estimated $13 million in deferred renovations necessary to improve operating efficiencies. Recent federal budgets drop funding for these hatcheries and call on the region through the Bonneville Power Administration to pick up their operating costs (about $10 million each year).

Faced with the uncertainty of continued federal support, Oregon's Senator Mark Hatfield has asked the region to develop options for local support for the hatcheries. Although it will be difficult to take over the funding, hatchery managers agree that a long-term, stable and predictable financial base for these important facilities is needed.

In addition to the National Marine Fisheries Service, other federal agencies, including the U.S. Army Corps of Engineers, the Bonneville Power

Administration and the U.S. Fish and Wildlife Service also fund hatcheries that are intended as compensation for dam-caused destruction of salmon runs. The Northwest states, several Indian tribes and the U.S. Fish and Wildlife Service operate the hatcheries. Most of these face problems similar to those at Mitchell Act hatcheries; they have deferred maintenance and repairs because of budget shortfalls. Now these hatcheries' effectiveness may be diminished as a result.

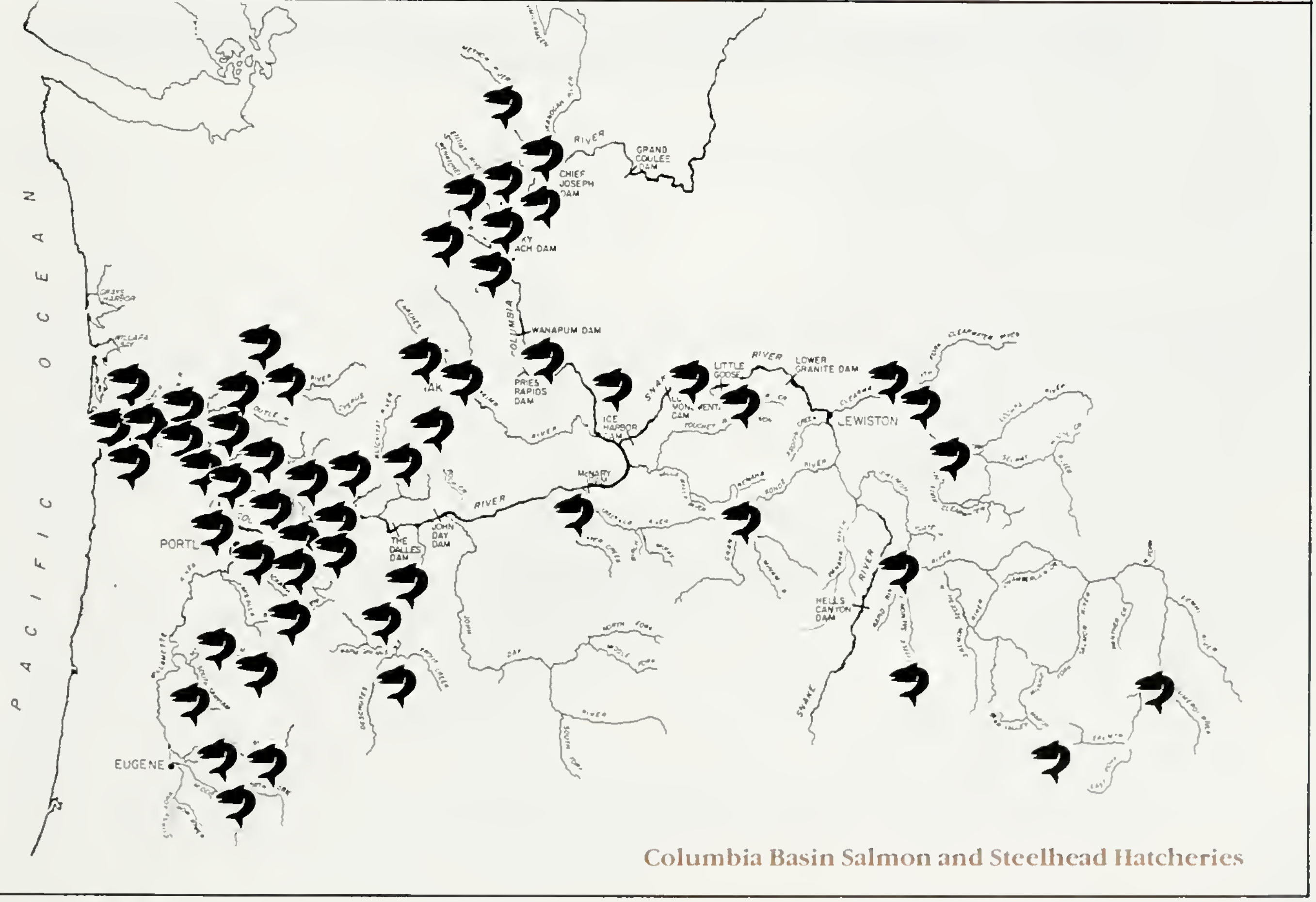
Increasing cooperation

Yet another element may be contributing to the slip in success rates for Northwest hatcheries: a lack of coordination among hatchery managers and among their policies. Consistency in management plans could encourage the transfer of viable procedures from one hatchery to another. Accomplishments could be replicated around the region.

Regional hatchery operators have begun this process through weekly and sometimes daily communication. Many of them serve on committees and technical work groups aimed at improving hatchery effectiveness. Through the fish and wildlife program's fish disease technical work group, for example, fish disease research has been coordinated and focused on agreed upon priorities. Outbreaks, such as this spring's discovery of "VHS" disease — a virus fatal to 80 percent to 90 percent of the trout in European infestations, but never before detected in this country — show that much remains to be learned. Cooperation in addressing this and other diseases will certainly improve the odds that solutions will be found.

It is clear that the Northwest has entered a new era in salmon and steelhead production. The barriers to cooperative problem solving are disappearing. Most fisheries managers agree that there has never been such unanimity of purpose among those who share a concern for the fate of the resource. Out of this collaboration there will likely emerge new techniques, new approaches and new facilities that rectify the shortcomings of the past and amplify the successes. ■

For more information, see: "Review of the History, Development and Management of Anadromous Fish Production Facilities in the Columbia River Basin," December 1988 (Draft). Columbia Basin Fish and Wildlife Authority, Metro Center, Suite 170, 2000 S.W. First, Portland, Oregon 97201.



Columbia Basin Salmon and Steelhead Hatcheries

SHORTS

The big drought that visited the United States in 1988 appears to be paying a visit to Europe and South America this year. Between December 1, 1988 and the end of February, precipitation in southern Europe was only 25 percent of normal. Throughout the Mediterranean, weather experts say, rainfall averaged 50 percent to 90 percent below normal.

Dry weather also affected Argentina, Uruguay and Paraguay during the same period. That led to lower-than-expected agricultural yields and prompted the city of Buenos Aires to shut off electricity for up to three hours a day in different neighborhoods in December and January. River levels were too low to operate at full power the hydroelectric dams that supply Argentina's capital. (Source: *The Billings* [Montana] *Gazette*, 2/23/89.)

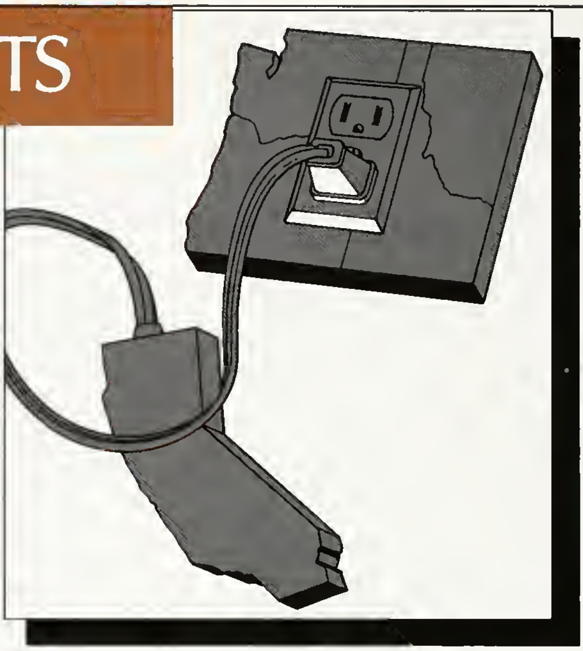
The United States and the Soviet Union this winter agreed to jointly combat poaching of North Pacific salmon they estimate has siphoned millions of dollars from each country's fishing industry.

U.S. and Soviet officials charge that hundreds of boats from Pacific Rim nations, many posing as squid-fishing vessels, string gill nets as long as 35 miles to intercept millions of immature salmon in their migration routes. They unload those fish to at-sea freezer boats, which sell the catch for large profits in Thailand, Singapore and other Far Eastern markets.

U.S. and Soviet officials agreed to share fisheries information and other data in a coordinated effort to prevent the illicit netting. (Source: *The Seattle* [Washington] *Times*, 2/15/89.)

For the first time in a decade, the United States imported more oil than it produced in January. The United States produced 7.9 million barrels of oil a day during the month, according to the American Petroleum Institute. During the same period, imports rose to 8.2 million barrels a day, a 21-percent jump from the same month in 1988.

This means that the United States imported 45 percent of all the petroleum products, including natural gas, it used in January. Its peak reliance on imports, in February 1977, was 48 percent. (Source: *Energy Conservation Digest*, 2/20/89.)



The Bonneville Power Administration in February sent a record amount of power on its direct-current intertie line between the Northwest and California. The federal power agency sent 3,100 megawatts on the high-power transmission line that links The Dalles, Oregon, with Los Angeles. That's enough electricity to supply three cities the size of Seattle. The record transmission, which utility sources say is the largest ever in North America, came as Bonneville tested recent improvements it and the Los Angeles Department of Water and Power have made to the line. (Source: *Associated Press*, 2/18/89.)

Scientists at the University of Utah announced they made an unprecedented nuclear fusion reaction using tests simple enough to be performed in a small chemistry laboratory.

The achievement, if verified, would represent a giant leap in the generation of nuclear power. It would be the first time that a controlled, sustained hydrogen fusion reaction has been achieved at room temperature. The experiment also was inexpensive, costing about $100,000. Physicists since the 1950s have tried to harness the energy from machines and lasers costing millions of dollars to produce controlled fusion.

B. Stanley Pons, a Utah chemistry professor and Martin Fleischmann, professor of electrochemistry at the University of Southampton in England, reported in March that they triggered a fusion reaction in a test tube that continued for more than 100 hours using a "heavy" form of hydrogen—deuterium—as the main fuel. Deuterium can be extracted easily from sea water, where it exists naturally.

Other scientists are trying to replicate their results. (Source: *The Wall Street Journal*, 3/24/89.)

Compiled by Gordon Lee

CALENDAR

May 9-12 — National Symposium on Practical Approaches to Riparian Resource Management, at the Holiday Inn, Billings, Montana. Sponsored by the Montana Chapter of the American Fisheries Society, the U.S. Bureau of Land Management, the Western Division of the American Fisheries Society, the U.S. Forest Service, the Society for Range Management, the Montana Riparian Association and the U.S. Fish and Wildlife Service. For more information: Glenn Phillips, Montana Department of Fish, Wildlife and Parks, Capitol Station, Helena, Montana 59620, or call Marilyn Goetzinger at 406-444-2406.

May 9-10 — Northwest Power Planning Council meeting at the Elkhorn Hotel in Ketchum, Idaho. (Note: This is a Tuesday/Wednesday meeting, not the Council's usual Wednesday/Thursday meeting.)

June 13-14 — Northwest Power Planning Council meeting at the Edgewater Hotel in Seattle, Washington.

(Note: This is a Tuesday/Wednesday meeting, not the Council's usual Wednesday/Thursday meeting.)

July 5 — Symposium on Indian Fisheries at the Sheraton Towers in Seattle, Washington. Sponsored by the American Fisheries Society-Western Division and the Native American Fisheries Committee. For more information: Frank Halfmoon, Symposium on Indian Fisheries, P.O. Box 14929, Portland, Oregon 97214, 503-231-6749.

July 12-13 — Northwest Power Planning Council meeting at the Grouse Mountain Lodge in Whitefish, Montana.

August 9-10 — Northwest Power Planning Council meeting at the Valley River Inn in Eugene, Oregon.

September 13-14 — Northwest Power Planning Council meeting in Idaho.

A more detailed calendar of Council committee meetings and consultations is carried each month in Update! See order form on back cover.

Compiled by Ruth L. Curtis

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The Northwest Power Planning Council is required to develop a program to restore the Columbia fisheries and a regional electric energy plan, to be carried out by the Bonneville Power Administration, emphasizing cost-effective conservation and renewable resources.

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Gordon Lee, Dulcy Mahar
Production: Marty Todd

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Please send me a copy of the following publications of the Northwest Power Planning Council. (Note: not all publications are available immediately, but they will be sent to you as soon as possible.)

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- ☐ (89-1) 1989 Supplement to the 1986 Northwest Power Plan (available in mid-May)
- ☐ (89-1A) Appendices: 1989 Supplement to the 1986 Northwest Power Plan
- ☐ 1987 Columbia River Basin Fish and Wildlife Program
- ☐ 1986 Northwest Power Plan
- ☐ (89-8) Issue Paper: Assessment of Regional Progress Toward Conservation Capability Building
- ☐ (89-9) Issue Paper: Bidding for Resources
- ☐ (89-10) Issue Paper: Regulatory Barriers to Conservation
- ☐ (89-12) Draft Northwest Power Planning Council Budget for Fiscal Year 1991 and Fiscal Year 1990 Revised
- ☐ (89-13) Draft 1989 Northwest Power Planning Council Annual Report (available in early July)
- ☐ (89-14) Staff Monitoring Report of Bonneville Power Administration's Actions in Response to the Conservation Objectives of the 1986 Action Plan

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- ☐ *Northwest Energy News* (this bimonthly magazine)
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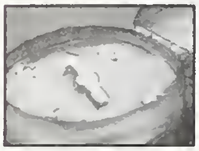

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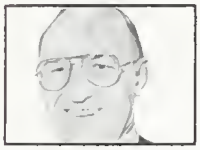

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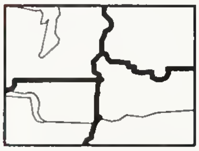

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Beginning with this issue, Energy News will be designed, typeset and "pasted up" entirely in-house by Council staff using Interleaf™ Publishing Software. It took a little longer to set up this first issue, so your Energy News may be a bit late. We apologize for any inconvenience.

This issue's cover illustration by Stephen Sasser is from a photograph of the Garrison substation by the Bonneville Power Administration's photo department.

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A RUN ON THE WILD SIDE

by Carlotta Collette

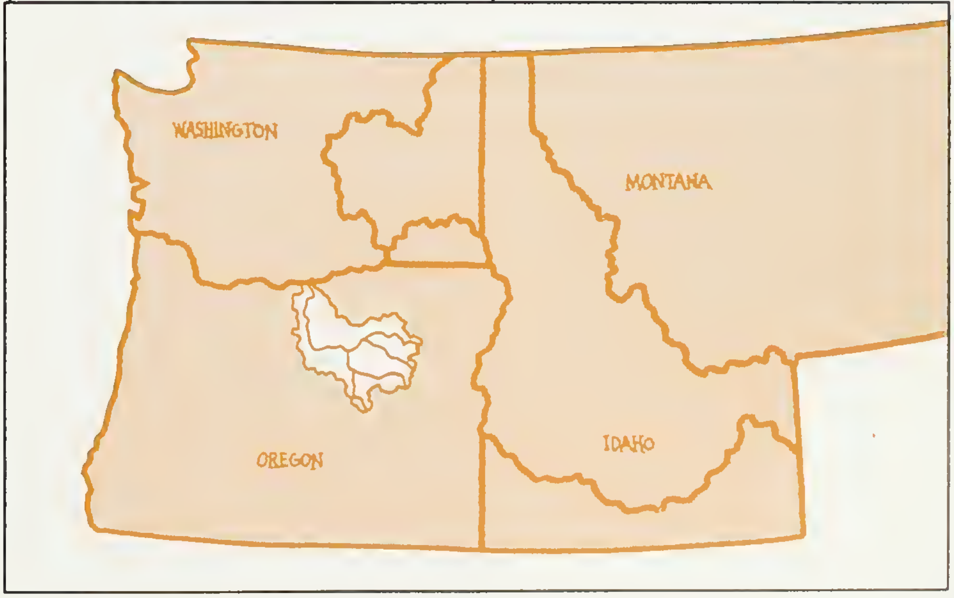
Habitat healers revive wild salmon runs in Oregon's John Day Basin.

Jackie Dougan thinks a brass band should be brought out to cheer on the wild chinook salmon and steelhead trout that return each year to the John Day River Basin in central Oregon. "They've made it past the big dams on the Columbia. They make it to the John Day. They wait in the lower basin for the rains to come, and then they come up here to lay their thousands of eggs," explains the U.S. Forest Service fisheries biologist. "They deserve applause."

Jeff Neal, a fisheries biologist with the Oregon Department of Fish and Wildlife, concurs. "These fish have to battle the elements from the day they come out of their mothers," he says. "They get up here and they try to spawn in habitat that's been stomped to death for years." Dan Brassard, a forester turned habitat steward, says "It makes you sleep better at night thinking you've done something for those fish."

These sentiments are surely shared, if not similarly expressed, by all who work to preserve and protect the unique wild runs of sea–going fish in the John Day. And the number of people and institutions pitching in on this production effort, which is part midwifery and part mimicking Mother Nature, is increasing almost as fast as the number of new salmon nests.

Since 1959, when the first survey of redds (gravel nests where salmon lay their eggs) in the basin was made, millions of dollars have been spent bringing more than 100 miles of long–abused spawning and rearing habitat back to something resembling its highly productive past. Efforts were slow to start, but the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program gave new impetus to the John Day work.



With investments from the Bonneville Power Administration totalling nearly $8 million since 1982, and additional Forest Service monies from timber harvest payments, the tide of neglect along the river has been turned. The result has been a gradual increase in returning salmon and steelhead.

On the land, the effect of nearly 30 years of planning and reconstruction is largely invisible, and that's the point. Unlike hatchery production efforts, there are few texts and virtually no coursework that teaches how to provide ample, quality habitat for wild fish to spawn in; and how to ensure a healthy environment for the one to three years the young fish may spend in the basin before they race down to the Columbia. The teacher here is time, and the lesson is, "study what has worked naturally."

There does appear to be an unofficial headmaster in this program, however. Errol Claire came up into the John Day as a student back in 1959. He was one of the redd counters who first put a number to the size of existing wild runs. "In those days," he reminisces, "the John Day was pretty isolated. There were no hatcheries, only a few lakes, no reservoirs, no major dams, and thousands of miles of potential that at some historic time produced a tremendous stock of wild salmon and steelhead." The persistence of many of those conditions to this day is what drew Claire back up into the John Day high country.

After graduating from school and a stint in the military, Claire returned to the John Day in the '60s on the staff of the Oregon Department of Fish and Wildlife. Eighteen years ago this summer he was named district biologist in charge of virtually the whole John Day Basin.

Errol Claire, the John Day River Basin's largely undisputed godfather of wild fish habitat repair efforts, has two basic rules for habitat recovery.

"First you have to deal with the causes of habitat degradation. Wherever you can, protect the habitat before the damage is done. If you can, manage the river so the habitat isn't destroyed."

Where the damage has already been done, such as on Camp Creek, shown above after 15 years of repair work, Claire's challenge is complex. "Habitat improvement is more than just putting something in a stream. It's more changing management on the stream so the habitat can restore itself." Whether it means putting boulders into a river to hold its bank or planting willows to shade its water the key is to simulate natural habitat that has been producing fish. "We concentrate on keeping our impact low, taking a delicate approach using natural materials," he adds.

From his first encounter with that land he recognized its uniqueness. There were still sizable indigenous runs, and the ecosystem promised likely increases, if it could be repaired. The problem in those early years was the absence of models that demonstrated increased wild fish production. Working with the Oregon Department, the Forest Service, the Bureau of Land Management, the Grant County Extension Service and the U.S. Soil Conservation Service, an endeavor to replant and rebuild shoreline habitat on Murderers Creek and in the South Fork of the John Day was begun.

As it happened, the John Day River Basin proved to be probably the region's best classroom for such a study. It provided more than 8,000 square miles of mixed–use land, geographically more varied than almost any other single river drainage in the West, so examples of both typical damages and untrammeled waterways were plentiful.

To picture it, imagine the river as an arm reaching south from the Columbia almost midway between the Idaho border and the Pacific Coast. After a wavering route south by southeast for 135 miles, actually a climb into rolling hill country and ponderosa pine forests, the arm points east, at what could be thought of as its elbow. After a forearm clamber up some 50 more miles, the hand of the river spreads wide, grabbing at mountains on all sides. Its mainstem runs a total length of 284 miles.

Photos by Carlotta Collette

The better part of the John Day Basin is bounded by the Blue, Elkhorn and Greenhorn mountains to the east, the Aldrich and Strawberry ranges to the south and the Ochoco Mountains to the west. Four forks make up the fingers; the South Fork, whose source is along the spine of the Aldrich Mountains with one reach tapping into the Blues; the main river, which takes its waters from the Strawberry, Aldrich and Blue mountains; and the North and Middle segments, which pour down from the crest of the Blue Mountains and their subranges, the Elkhorns and Greenhorns. Lacing together these major courses are thousands of feeder creeks, although the basin itself is considered arid.

There are still some stretches where all these streams look like they did when trappers first ventured up them. These preserved reaches are the habitat student's textbook. Brush and tall grass grow thickly, right up to the water. Boulders break the surface and slow the flow of streams. Pools are gouged where the water narrows into natural channels or drops off small ledges. The shade of overhanging trees keeps the water cool, and stones, downed trunks and young green saplings hold the streambanks when the spring runoff or flash floods test them.

All of these are indications of habitat that is prime for spawning and rearing salmon and steelhead. And, indeed, the watershed of the John Day was historically a very productive basin, contributing several hundred thousand fall and spring chinook salmon and summer steelhead to the larger Columbia River Basin runs.

The Forest Service and the Oregon Department of Fish and Wildlife have two slightly different approaches. Because the Forest Service only deals with public lands, it is restricted in what it can do. Some riparian (streamside) reaches have been fenced off and replanted, but fencing all the streams would be prohibitive. "Besides, what would that look like?" questions Dan Brassard, who works with the Forest Service in the upper John Day. In a compromise move, livestock are grazed in a "rest and rotation" cycle, so the land can recover after each season. Ranchers with grazing privileges on public land are encouraged to limit the number and amount of time cattle and other livestock are allowed into fragile waterside areas.

But today, on many long meanders, cottonwoods and willows have given way to grasslands. Cattle graze up to and in the water. Even in the higher elevations, where livestock seek shade and cooler water, grass never gets much higher than a few inches, and trees, some with rings that mark more than 20-years' growth, top out at two-feet, stunted by perennial pruning. Without cover, the streams heat up. Much of the water evaporates. Steady trampling of what is known as the riparian zone — the land closest to the water on each side — has spread out the water, silted up the shallow areas and rendered it inhospitable to spawning salmon seeking clear, cool water, shade and gravel in which to lay their eggs.

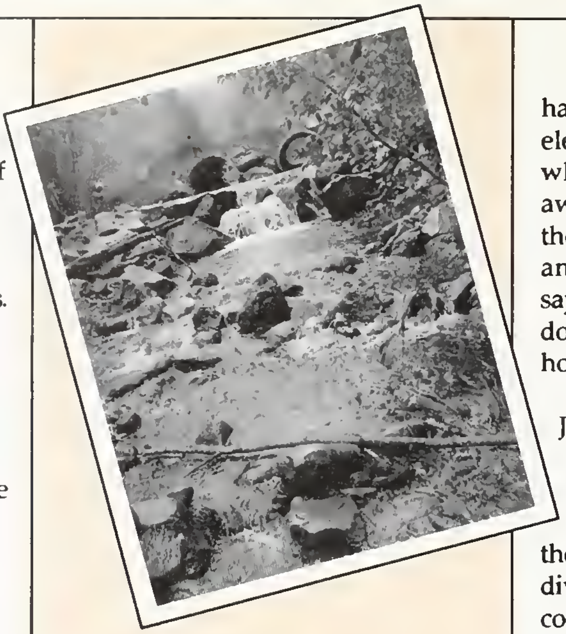
Higher up on some forks of the John Day, mining was the culprit that nearly killed the streams. At first there were small clusters of miners wading in the water with their proverbial pans, and some of them got rich. But that was inefficient. An easier way to pull all the value, in minerals at least, out of a stream was to move a continuous-feed dredge straight up the creek. The dredge scooped stones and river bottoms up, spit out the common stuff and left the heavy gold to be harvested. In the short history of the mining boom in the John Day area, more than $26 million in gold was taken.

What was left were mountains of stones, silt-filled streams dislodged from their banks, and abandoned mines on steep grades, leaching toxic metals to this day. On some reaches, such as the upper end of Clear Creek in the drainage of the North Fork of the John Day, the beaches and gravel are red with iron and other mineral discharges. The residue from 50-year old mines alters the acidity of the water and makes it uninhabitable for the spawners and their young.

Logging also took its toll on the wild fish habitat. Downed trees were frequently shuttled out of the uplands via creek beds. Rail spurs off main train lines followed creeks and occasionally cut directly up the streams, too. Even the roads built to move logs and loggers left their scars. Waters were muddied, streams rechanneled and sediments covered spawning gravels.

But perhaps an even greater threat to the John Day fish lurks outside the basin on the mainstem of the Columbia – the salmon's route to the sea. Between the confluence of the John Day and the mouth of the Columbia, three major federal hydropower dams challenge the John Day migrants. Young fish that survive their rush past the deadly turbines have yet to contend with predators below each dam and harvesters at sea. Those that persist against these odds still have their upriver push ahead, and the dams once again loom in their path.

In recent years, increased flows and better bypass systems combined with more rigorous controls on the ocean commercial fish harvests have improved the chance of survival for all Columbia River Basin ocean–migrating fish. But in the past, even migrants with as few dams to cross, such as those from the John Day, lost more than a quarter of their lot enroute to the sea, and only a remnant made their way back up the river to spawn. Today, the odds have improved, but they are still not good.



In some cases, road work has caused problems for migrating salmon and steelhead. Here, two culverts carry Granite Boulder Creek under the road. Unfortunately, these left the river about 8 feet above the creek level. To raise the water to the culvert height, logs and boulders were placed in the creek to make a series of low steps with ponds above each. Upriver migrating fish can work from one level to the next and then swim on up through the culverts.

Couple these hurdles with the habitat problems that await the travelers on their return, and it is clear why those who watch for them are in awe – and pleased with what success they've had. After his considerable and life-long commitment, Claire says he's "not ready to jump up and down yet, but the runs appear to be holding their own, and some are up."

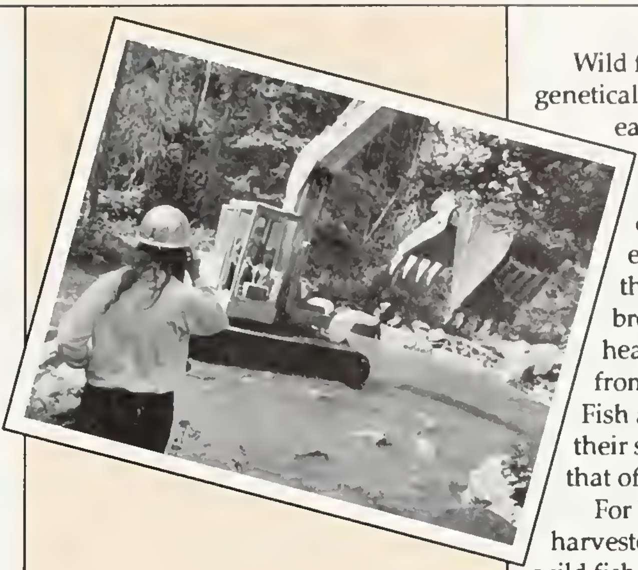
On the upper mainstem of the John Day and in Granite Creek, where habitat work is nearly complete, the number of redds spotted has more than doubled in the past year. On Clear Creek, where diversion pipes and seepage bogs are contending with toxic mine discharges, while newly constructed ponds and other habitat improvements recover rearing environments, the runs are up 30 percent over 1988.

But what most pleases the John Day fish watchers is the fact that this basin's salmon and steelhead are still all wild. They have not cross-bred with hatchery-reared fish. They are genetically distinct. In all the Columbia River Basin, the John Day is the longest free-flowing river with exclusively wild sea-going runs of both chinook and steelhead.

Except for the occasional hatchery fish that may stray into the John Day (none have been spotted in recent memory), these fish are a breed apart. Several breeds apart in fact. Each of the four fingers of the John Day and most major creeks supporting fish harbor genetically discrete populations of salmon or steelhead. Their distinctions are subtle, but evident in the variation of their life cycles. They enter the river at different times, move up and down from cooler to warmer waters on different schedules and ultimately spawn and hatch in seasons perfectly matched to the John Day climate.

The virtue of their wildness is much debated in the Northwest, where hatcheries have long been the easiest and fastest way to put plenty of fish into a river system. But fisheries experts are beginning to discover that the region's reliance on hatcheries for three–quarters of its salmon and steelhead has its problems. And raising the ratio of wild and naturally spawning fish to hatchery fish could provide insurance against a variety of possible future "crop failures" in the fishery.

Some biologists argue that hatcheries have many of the problems monoculture farming evidences. Where only corn, for example, is grown in a field year after year, insects and diseases that attack corn can move in and wipe out the whole crop. Similarly, the genetic diversity of the species is narrowed in hatchery production. Reduced genetic variation leaves the species vulnerable. Disease in a hatchery can eliminate millions of young fish. A natural disaster that coincides with a hatchery release or the uniform return of a hatchery run can mean the destruction of that run.



The well–named master of the crane–operated scoop, Lyle Rivers, had to cut a road down to Desolation Creek to position himself for pool digging. On seeing district biologist Jackie Dougan approach, he asked, "What do you want me to do about the road when I'm through here?" But he didn't wait for an answer. "The usual – make it disappear," he muttered, mostly to himself.

Wild fish, on the other hand, are genetically complex. Each run up each creek has adapted over time to the trials of its special migration. Disease and disaster are less likely to eliminate large numbers of these fish because they have bred–in resiliency. These are hearty stocks, and researchers from the Oregon Department of Fish and Wildlife suggest that their survival rate is about twice that of hatchery fish.

For both commercial and sport harvesters, a robust population of wild fish would be a boon. In the natural Columbia River Basin, before dams cut off habitat and overfishing and a host of other hazards eliminated the runs of certain seasons, wild fish were in the river virtually all year round. Wild fish migrations occurring throughout the year could once again extend the harvests, providing more than just the predictable spring and fall fishing seasons that dominate today's catch timing.

But for many people, the value of wild fish, like the value of any untamed system, is more difficult to quantify. The societal, aesthetic and even spiritual benefits derived from sustaining creatures such as these are far less tangible but nonetheless real. As an Oregon Department of Fish and Wildlife report explains, "They may be keys to questions we have not yet learned to ask."

Not Just Another Big Fish Story

Imagine a 24-foot salmon luring children inside its open mouth to lecture them on the importance of salmon and their habitat. This is not a cross between an angler's dream and a parent's nightmare. This synthetic fish actually exists on Washington's Olympic Peninsula. It was conceived and created by Wild Olympic Salmon, a unique grassroots group that is "dedicated to a healthy watershed for wild salmon and their chums."

Wild Olympic Salmon was recently honored by the Washington Department of Fisheries with a Cooperative Program of the Year Award "for its outstanding communitywide efforts to inform and educate the citizens of Jefferson County about the importance of salmon within the ecosystem."

Jefferson County trading cards by county artists

Wild Olympic Salmon volunteers (ranging from fishery experts to just plain interested folks) work on projects to enhance the habitat of the salmon by surveying streams; planting trees, shrubs and grasses on stream banks; building fish ladders; and carrying out other activities to assist fish passage and create spawning and rearing habitat. In addition, volunteers have also developed extraordinary cultural and educational activities.

Last year, volunteers built the 24-foot "migrating salmon," which visits local schools accompanied by speakers and performers. Children were given the opportunity to crawl inside the fish to view paintings of ideal spawning habitat. Wild Olympic Salmon hopes that the visual impact of this larger-than-life fish will focus attention on the importance of salmon in watersheds and the necessity to care for the environment.

More recently, the group has worked on a trading card project. Local artists depicted the animals, plants and soil of the Jefferson County community on cards that were then marketed throughout the area. Collecting the cards quickly became a popular hobby for local residents.

Wild Olympic Salmon is also sponsoring a salmon festival on November 25 to culminate the Washington centennial year's educational and cultural activities in the county and celebrate the return of the salmon to the streams. To finance the festival, a quilt made by the community will be raffled off. A core group of quilters organized the project and created the quilt, which depicts a scene of the area's Chimacum Valley. Members of the larger community sewed individual salmon that were then appliqued on the finished quilt, aptly christened "Salmon Rain."

These are just a few examples of the work Wild Olympic Salmon is doing to restore the watersheds in their area. As member Tom Jay reported in the group's newsletter, "It is because we recognize wild salmon as the literal expression of the vitality of our own place, its soul if you will, that we in Wild Olympic Salmon want to celebrate and encourage these marvelous beings."

For more information on their activities, contact Wild Olympic Salmon at P.O. Box 585, Chimacum, Washington 98325.

—Ruth L. Curtis

NATIONAL ENERGY COMPASS POINTS to the NORTHWEST

Compiled by Gordon Lee

Seattle speakers attract attention of federal energy strategists.

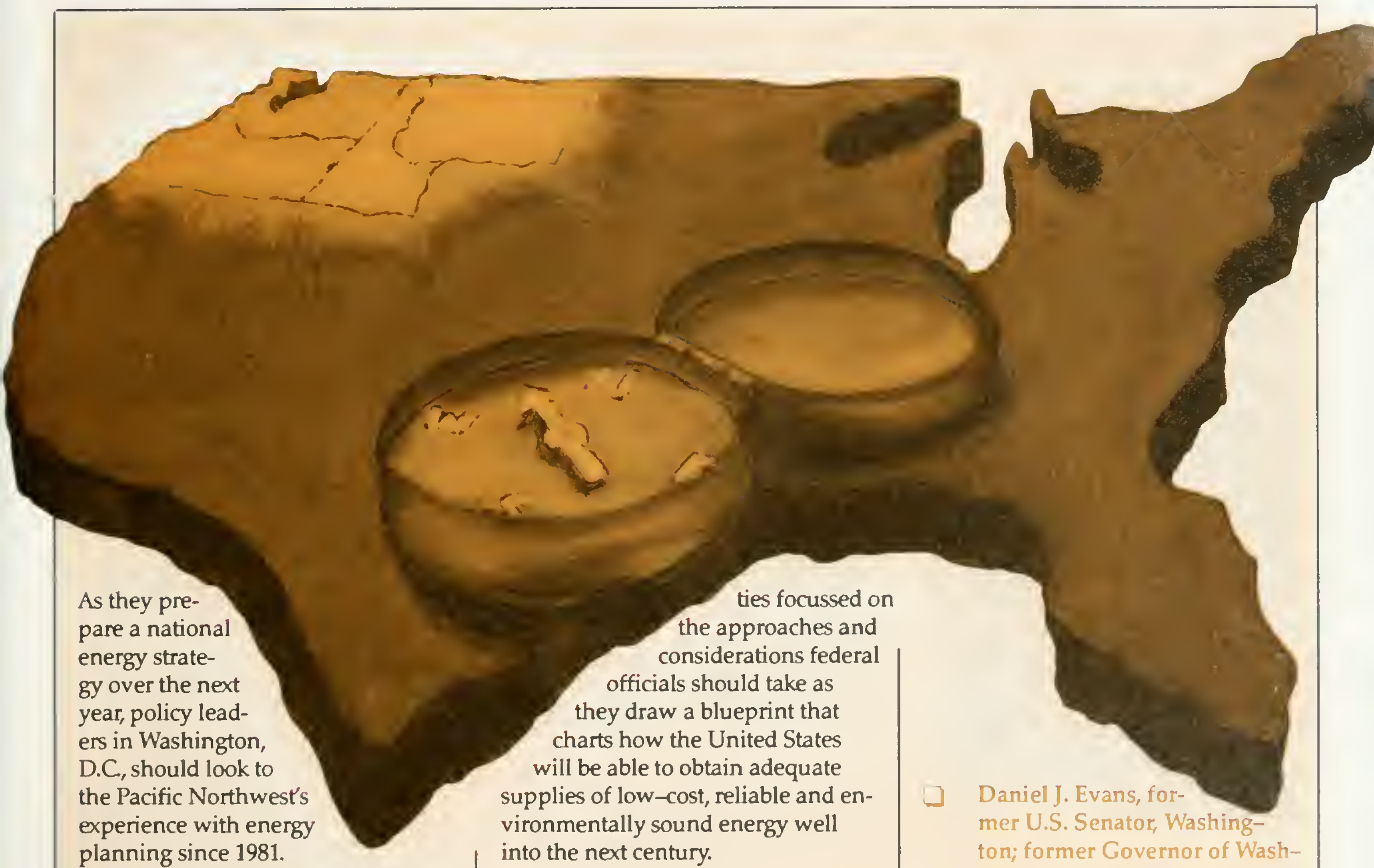


Illustration by Tom Hardy

As they prepare a national energy strategy over the next year, policy leaders in Washington, D.C., should look to the Pacific Northwest's experience with energy planning since 1981.

That's the gist of testimony U.S. Department of Energy Secretary James Watkins heard from an array of well-respected policy-makers at a recent hearing on national energy strategy in Seattle. That hearing was one of five the Energy Department held throughout the country this summer and fall to gather public testimony on national energy issues. Speakers in Seattle and the other cities focussed on the approaches and considerations federal officials should take as they draw a blueprint that charts how the United States will be able to obtain adequate supplies of low-cost, reliable and environmentally sound energy well into the next century.

The Pacific Northwest has achieved a national and international reputation for its efforts toward conservation, energy planning and least-cost energy solutions over the past eight years. That experience could serve as a model for national efforts to derive an overall energy plan for the 1990s and beyond, speakers in Seattle said. Here's a sample of their comments:

☐ **Daniel J. Evans, former U.S. Senator, Washington; former Governor of Washington; former chair, Northwest Power Planning Council**

We have developed no cohesive energy policy or plan in spite of repeated requests by Congress and efforts by administrative leaders to do so. There have been some worthwhile efforts. The initiation and building of a strategic petroleum reserve is commendable and gives us at

"Individual homeowners, commercial establishments and businesses ought to be viewed as miniature generating plants with potential energy to sell."

—Daniel J. Evans

least a small protection against future oil supply disruptions. We have also achieved some considerably better efficiencies through conservation, although much of this has been done either independently or by action at the state level, rather than through federal leadership...

In 1988, Senator [Timothy] Wirth [Colorado] and I made a proposal during the 1988 ANWR [Alaska National Wildlife Refuge Bill] mark–up in the Energy and Natural Resources Committee. This proposal would have required the development of a national energy policy or plan that would allow us to measure the relative priorities of proposed new energy sources...

In order to get the best results out of energy conservation, I believe it is important to give appropriate price signals to consumers and to industry. We should attempt to factor in all of the known environmental costs of energy production of whatever type. Only then can we get a true picture of the economic potential of new efficiency measures. In other words, the full cost of correcting coal plant emissions and the full cost, including long–term waste disposal from nuclear plants, must be in the consumer price of energy from those plants. If not, it will be impossible to fully utilize beneficial conservation and efficiency initiatives...

It is important to ensure that electric utilities are able to put into their rate base their efforts toward conservation. Unless that is the case, there is little incentive for utilities to be aggressive on conservation measures...

I believe strongly in paying for conservation measures either partially or clear up to avoided costs.[1] Individual homeowners, commercial establishments and businesses ought to be viewed as miniature generating plants with potential energy to sell by increasing conservation efforts to reap the rewards of energy conservation, just as a utility reaps the rewards of energy sales from a central plant. We found in the Pacific Northwest that there was little response from industry when we asked them for their estimates of energy conservation potential. However, when we asked them how much might be available if we paid $1,000 per installed kilowatt for permanent energy savings, we received offers of over 400 megawatts of electricity from one major industry alone...

New electricity generating capacity unquestionably is going to be needed, although I believe that we have only scratched the surface of electric energy conservation and efficiency, including new techniques of peak load management...

In any case, we should first adopt those energy responses which are least expensive so that maximum environmental mitigation occurs as soon as possible. This least–cost approach almost certainly will ensure a national energy policy heavily weighted toward conservation and efficiency.

❑ Tom Trulove, chair, Northwest Power Planning Council

After eight years of testing and demonstration, I can confidently say that least–cost power system planning is a proven approach ready for implementation by the federal government. Our experience has become a model for other parts of this country and for other countries, too.

The Council has been a pioneer in new techniques to select resources that will provide an adequate supply of electricity at the lowest possible cost.

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[1] Avoided cost is an investment guideline that describes the value of conservation and generation resource investments in terms of the cost of more expensive resources that would otherwise have to be acquired.

Photos by Ken Gatherum, Boeing, Richland, Washington

Conservation has been demonstrated to be a reliable, low–cost, and environmentally benign resource. We have already acquired 350 average megawatts in energy savings at just half the cost for the same amount of power from a new coal plant. We saved ratepayers nearly a billion and a half dollars in doing so.

Actions we have taken to improve standards for buildings and appliances will save up to another 700 megawatts – a good investment with more savings possible. In fact, we expect to save up to 2,500 megawatts over the next 20 years – the equivalent of the output of six new coal plants, at half the cost of those plants.

Integrated resource planning – what has come to be called least–cost planning – is being implemented in over 30 other states. The Council is also working with more than a dozen foreign countries that want to learn from the lessons in the Northwest.

I am pleased to note that the planning framework of the Act has been included in legislation sponsored by Congresswoman Claudine Schneider of Rhode Island, with over 100 co–sponsors. Similar provisions are also included in a Senate bill co–sponsored by one–third of the Senate...

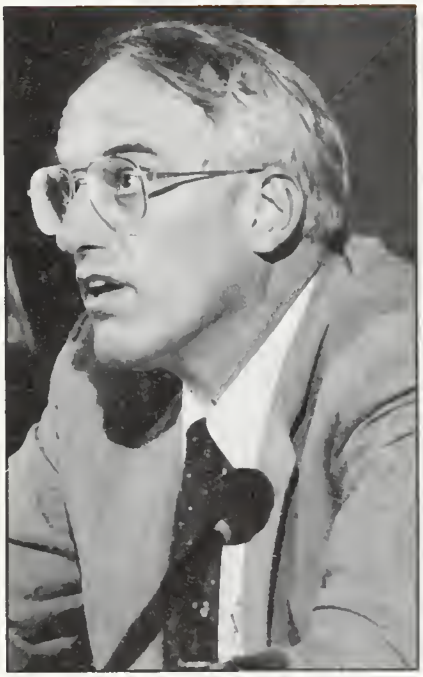
Our planning process – the process I urge you to consider as part of your national strategy – stands on three key principles:

One: Power planning must address the uncertainties and risks inherent in any future–oriented exercise.

Do not expect the future to follow a given path. Evaluate your resource choices against a range of future scenarios...

Develop a plan that will meet whatever energy growth develops at the lowest possible cost both in dollars and in environmental consequences...

> *"After eight years of testing and demonstration, I can confidently say that least–cost power system planning is a proven approach. . . ."*
>
> *— Tom Trulove*



Two: All available resources, including conserved energy, should be compared on a consistent basis.

A megawatt saved will provide the same services as a megawatt generated at far less cost than other new resources. Furthermore, conserved energy does not have to be imported, thus reducing our nation's reliance on unstable world markets...

Three: Power system planning should be carried out in an open, public process.

Involving all interested parties improves the quality and acceptance of the final plan,and helps build a consensus for action. While some Northwest utilities have been reluctant to spend money on energy–efficiency programs during our recent power surplus, they are now showing interest as the surplus disappears.

Sharon Nelson, chair, Washington Utilities and Transportation Commission

The United States uses twice the amount of energy to produce a dollar of gross national product as does Japan, and 87 percent more than West Germany. These numbers mean that other nations, many of whom are our chief rivals in world commerce, do not have to spend as much on energy as we do. This hurts Americans right where it counts – in our pocketbooks. This high energy bill also undermines the competitiveness of all American firms in an increasingly global economy...

Electricity use in the country is growing at a resurgent rate. Many analysts are now worried that utilities will not be able to supply power to homes and businesses unless new industry and regulatory initiatives are undertaken...

"Rising demand for energy is not necessarily bad; what is bad is inefficient energy consumption."

— Sharon Nelson

I recommend to you that the plan should include, as its top priority, an emphasis on improved energy efficiency. Whether for reasons of national security, economic competitiveness, or environmental quality, improving energy efficiency is clearly the most cost–effective first step we can take.

Some who advocate energy conservation argue that energy consumption in and of itself is an evil. I do not take that position. Growth in energy consumption can be a sign of a healthy economy—an economic goal we all share. Rising demand for energy is not necessarily bad; what is bad is inefficient energy consumption. We need a national energy strategy to take a rational look at this issue...

With respect to the electric and natural gas industries, the national energy plan should also focus on increasing energy efficiency. We are trying to implement such a strategy here in the Northwest. As you know, Congress in 1980 passed the North–west Power Planning Act, which directed this region to develop conservation plans for electricity. The states and localities in the Northwest are now adopting construction standards for new energy–efficient buildings. This effort needs to take place throughout the country, and the national energy plan should call on all parts of the nation to develop standards for energy–efficient new construction...

As the need for new electric resources becomes evident, the national plan should suggest to state regulators that competitive bidding systems be adopted to assure ratepayers that new generating resources will be "least–cost" ones. Several states across the nation, including Washington state, have recently adopted such a regulatory system.

☐ **Richard Watson, director, Washington State Energy Office; chair, Western Interstate Energy Board**

It suffices to say that the least–cost planning principles pioneered by the Council here in the Northwest are now reflected in least–cost or integrated resource planning efforts being carried out by utility commissions and utilities throughout the nation, including here in Washington, and in the national energy policy recommendations of the National Governors' Association and the National Association of State Energy Officials. Those same principles should form the basis for the national energy strategy. The key priorities are as follows:

The national energy strategy should be viewed as a process which is revisited periodically and which provides ample opportunity for input, review, testing and comment by the public and interest groups including the states, Indian tribes and local governments. You have made the right first steps. It must continue throughout the process. In particular, the data, models and analysis which form the basis for the strategy must be accessible. Only through such public involvement will it be possible to build a shared understanding of the options before us and their respective costs and benefits.

"Our experience tells us that the more efficient use of energy. . .will be the least-cost option for. . .some years to come."
— Richard Watson

The national energy strategy should be developed in a "least-cost planning" framework. This implies developing a strategy which has as its guiding objective the minimization of total societal costs including not only the direct dollar costs of supplying energy or reducing the use of energy, but also such indirect costs as: environmental costs, e.g., the costs of oil spills, the greenhouse effect, acid rain, urban air quality, fish and wildlife losses and so on; national security costs; and the effect on our international balance of payments and its effect on our economy.

This is not a utility or energy supplier perspective or a consumer perspective, it is a societal perspective...

The national energy strategy must begin with an end-use focus, looking at the energy service being provided — warmth, mobility, light, heat, motive force, and so on — and then determining the least-cost means of achieving that end. Energy is not the end. It is what we derive from energy that is important. An end-use focus implies looking across energy types and at both supply- and demand-side options to find the least-cost alternative for meeting a particular end use. Clearly we will need new sources of energy. Our experience, however, tells us that the more efficient use of energy — conservation — will be the least-cost option for many applications for some years to come...

The national energy strategy must take a long-term perspective. The energy and environmental problems facing us are long term in nature. The decisions we make now will affect generations to come. It is essential that the national energy strategy not discount the future so heavily that future costs and benefits have no weight in the decisions.

The strategy must also have as its goal risk prevention and resilience — the strategy must be robust enough to be viable over a relatively wide range of possible energy and environmental futures. It is impossible to know precisely what the future holds. It is therefore essential to develop a strategy, which may not be optimal for any one future state, but which, in decision analysis terms, yields the lowest expected cost over a range of plausible future states.

The strategy must deal with interregional effects and consideration of interregional equality. The different regions of the country are different, facing different costs, having different energy-use patterns, different environmental circumstances and having different supply options. Policies will affect different regions differently. For example, we in the Northwest have an extensive hydroelectric resource, and we are taking extraordinary efforts to preserve the benefits of that hydropower for future generations and mitigate the environmental impacts of that development...

The national energy strategy must incorporate an action plan — a series of steps, milestones, objectives, which are then reflected in federal policy and budgets. The action plan should address such factors as: research, development and demonstration priorities; information and technology transfer activities; energy and environmental regulations; and market incentives such as energy taxes or tax incentives.

The national energy strategy must be the basis for energy development decisions. Specifically, consistency with a least-cost based national energy strategy must be a necessary condition for energy exploration and development in environmentally sensitive areas like the outer continental shelf regions of Washington and Oregon.

❑ Corey Knutsen, director, strategic planning, Puget Sound Power & Light Company

The Council has been doing regional planning since [the] early 1980s and has done a lot to advance the science (or maybe art would be a better word) of utility planning in the region. Public involvement was an important part of their process. They involved staff from utilities, government and other energy organizations in a technical advisory role...

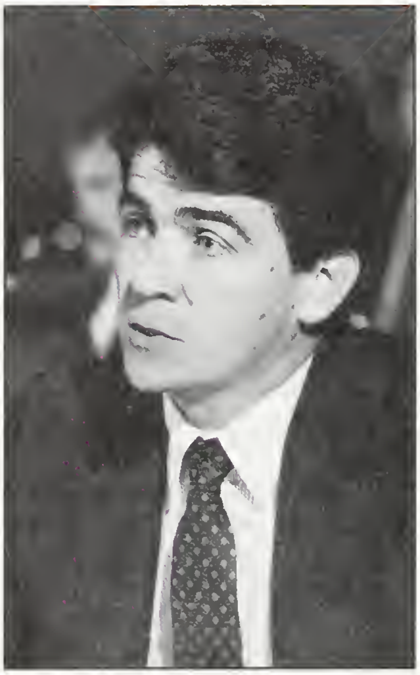
The result of least–cost planning at Puget Power is a comprehensive strategy including a range of resources and acquisition approaches...

Since 1978, Puget Power has aggressively pursued programs which invested in efficiency improvements in our customers homes, offices and other facilities, spending nearly $200 million on these programs during that time. This money has been invested retrofitting existing residential and commercial facilities as well as providing incentives for efficiency improvements in new construction...

Besides being an important resource in our planning process, improving energy efficiency at our customers' facilities makes our product more competitive. Giving our customers more for their energy dollar in this increasingly competitive environment just makes good business sense. [B]y making our customers' facilities more energy–efficient, they are more competitive in their own industry, making for a stronger, healthier local and national economy...

Another reason we have been able to pursue this resource as aggressively as we have, is because in this state the Legislature and the Washington Utilities and Transportation Commission have taken pioneering steps to encourage development of this resource. They provided an extra 2–percent return on equity for utilities on their investments in energy–efficiency programs. In addition, right now, the commission is considering suggestions for more expedient cost recovery for these programs, thereby further encouraging them. ■

> *"Giving our customers more for their energy dollar in this increasingly competitive environment just makes good business sense."*
>
> *— Corey Knutsen*



DULCY MAHAR ■ INTERVIEW WITH

WILBUR ANDERSON

Montana's dean of public power offers an intermountain view.

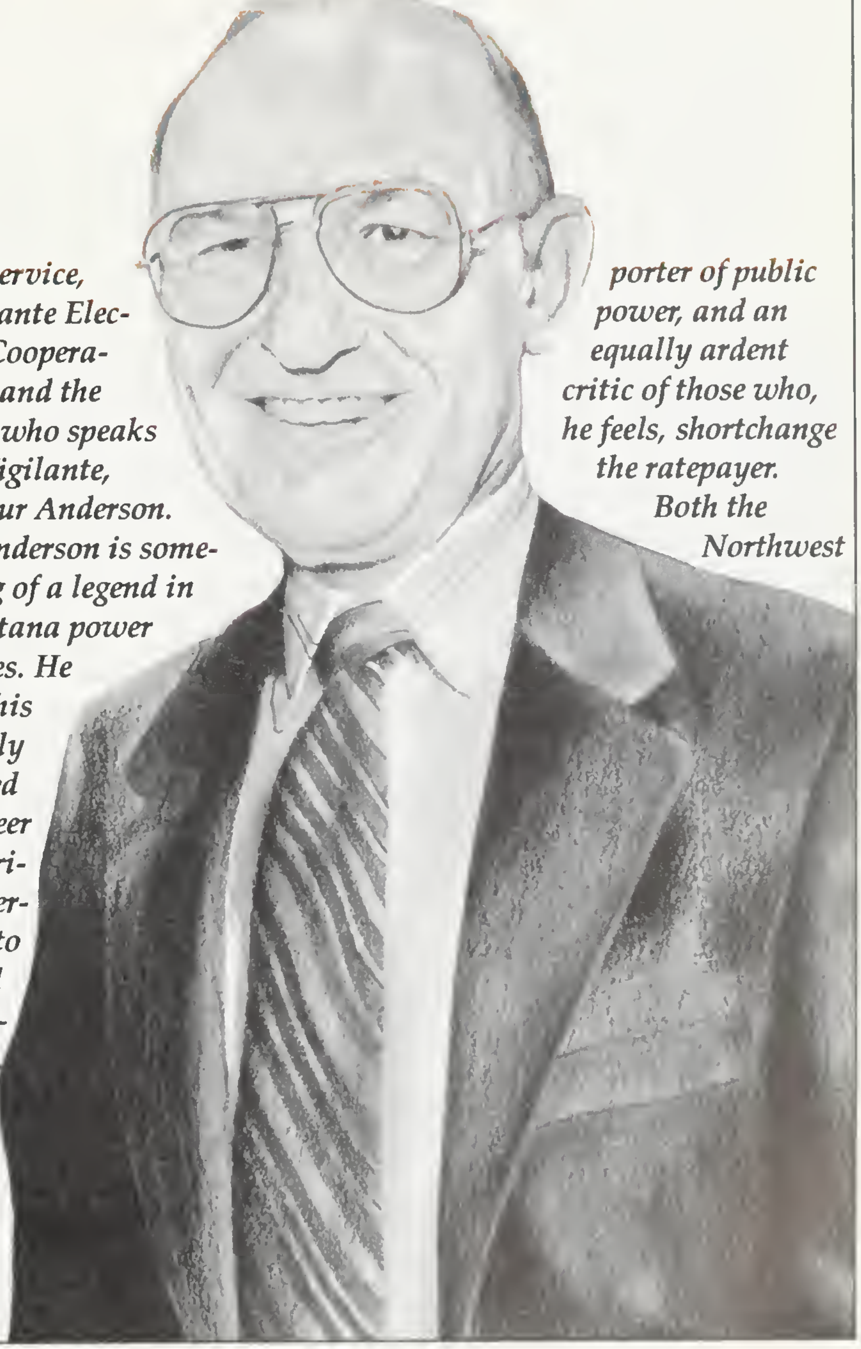
To those outside the geographic region, it's easy to think of the Northwest as one big, wet, green corner of the United States. Those inside the region know better, but tend to draw a line down the region, dividing it into green and golden sides.

Even that distinction fails to take into account the enormous variety within the Northwest. For example, there are electrical power service areas with customers so remote that it still takes horses to bring in poles. Some of these areas have power needs so different that, despite having bitterly cold winters, the area's energy needs peak in summer—exactly the opposite of the Northwest as a region.

One such area spans vast sections of southwestern Montana, encompassing nine counties. Two things proclaim the uniqueness and toughness of this area—the name of the electric service, Vigilante Electric Cooperative, and the man who speaks for Vigilante, Wilbur Anderson.

Anderson is something of a legend in Montana power circles. He and his family helped pioneer electrical service to rural Montana. He is an ardent supporter of public power, and an equally ardent critic of those who, he feels, shortchange the ratepayer.

Both the Northwest



Portrait by Lynn Carson

Power Planning Council and the Bonneville Power Administration have come under his fire.

For the past 14 years, Anderson has been manager of Vigilante, a cooperative based in Dillon that serves just over 3,000 members scattered so far and wide that there are fewer than 3 consumers per mile. Vigilante, which buys its power from Bonneville, was founded in 1937. Forty percent of its load is irrigation, hence the system peaks in summer despite serving areas that remain subfreezing for weeks and months.

Anderson is a man of his region. He is a third generation Montanan whose family are ranchers. (The family still owns, but leases out the family ranch.) Anderson's family built much of the original telephone service system in the southeastern portion of the state where the family ranch is located, putting in poles themselves. Anderson's father helped start four cooperatives—electric, telephone, grain marketing and wool marketing co-ops.

Anderson himself began his career working as a teacher for the Bureau of Indian Affairs after earning a degree from Fort Hays Kansas State and graduate work at Purdue University and Rocky Mountain College in Billings. But with a family to support that included three little girls, he accepted an opportunity at Park Electric near Yellowstone Park in 1964. From there, he worked at two more Montana cooperatives as well as Okanogan Public Utility District in Brewster, Washington, before joining Vigilante. His primary jobs before becoming a manager were as an energy conservation and electrical advisor.

Anderson is a past member of the executive board of the Public Power Council and a past president and board member of the Northwest Public Power Association. He is currently on the legislative committee of the Montana Electric Cooperatives' Association.

Q. Vigilante Electric is a unique name for a utility. It suggests the raw West and the rugged individualist. How are the power needs in your area different from other parts of the Northwest?

I would say our system is unique. We go south into Idaho, and it is three hours driving time from south to north and about two hours from east to west. We serve about 1,500 square miles with 14 substations and about 2,300 miles of transmission and distribution lines. We only have 2.4 meters per mile of line as opposed to about 15 meters per mile for the Montana Power Company.

Our service area is made up almost entirely of ranches and farms. We do serve a few small villages, but that's about it. Many of these ranches are way up canyons in very difficult areas to get to, and much of this line was built with horses. Even today, to change some poles, we would have to rent horses to get another pole back in there.

Our area is perhaps like some areas might be in foreign countries because of the things you have to do at times to keep the system operating, like borrowing horses, utilizing snowmobiles and things of this nature, just to try to keep a system standing.

Even today, to change some poles, we would have to rent horses to get another pole back in there.

Q. To someone from west of the Cascades, your service territory really does seem like a foreign country. You're serving people as high as 7,000 feet up in a Montana winter. When we have a power outage, it is not normally a matter of life and death. In your area it could be.

That's especially true where they start calving early. They lose lots of calves if they can't get them in and get them warmed up. In lambing season, they just simply lose them. That's why it is so vital that you have a system that is going to provide the reliability that you need during the severe winter.

This past winter, for instance, Sunriver Electric West in Great Falls lost 60 poles in one stretch of line. Some of this was new line. Glacier Electric at Cutbank lost about 35 poles, and they had windows blown out of vehicles trying to get to areas to get the line back up. In Shelby, the Marias Electric Co–op lost about 30 poles, and the wind was so high it was blowing rocks the size of golfballs through the windows of some of the vehicles and absolutely tearing down good, modern distribution facilities.

Some of these areas couldn't get service back on for a week and a half. It was one of the worst winters we've had, and some systems sent crews to help them get these systems back. These are very costly problems, very difficult for the people who live out in those hills.

It was just through ingenuity that many of these systems could be built. It was an extremely difficult job. In many cases, a group of farmers and ranchers had to figure some way to make it work.

Q. You evoke visions like the driving of the golden spike. In many ways, it appears the utilities as well as railroads settled the West. They had the same pioneering effort in making the land hospitable.

It actually brought much of this area into the 20th century, believe it or not. Where I grew up, we had batteries, and we had wind generators, and then we had a gasoline standby generator.

After fighting these for years and years, trying to keep them operative, you really appreciate having modern service available. It was such continual drudgery to try and keep something operating that was just very tenuous at best. It would require constant care, and then you had fires and breakdowns on the standby generators.

The only time you could ever weld a piece of broken equipment or machinery was when you had enough wind that you could operate a wind generator and your standby generator at the same time. You couldn't afford to run 55 miles into a town every time you had a breakdown. You just had to fix it.

> **Where I grew up, we had batteries, and we had wind generators, and then we had a gasoline standby generator.**

The Montana Power Company helped a lot of cooperatives get started, because they didn't want to serve the rural areas. To them, it didn't look like a money–making proposition. Not long thereafter, even though the cooperatives were getting power from Montana Power to sell to rural areas, Montana Power started looking at the cooperatives not only as a customer but also as a strong competitor.

We fought to survive for years and years. Many of our systems operated at a loss year after year. We've had to fight for everything we've ever accomplished. It was a tough existence just trying to provide a vital service to rural people. We were going to survive, and we were going to make it, and we have in most cases, but it has been a 40– to 50–year process.

Q. There is a lot of talk now about the region having used up its surplus of power. There is controversy over whether the sky is falling, or if it is simply a temporary revenue problem. What is your view on it?

This past February was a prime indication of where we are in the Northwest. We all depend to a great extent on Bonneville. When it came right down to real high load and extreme cold in nearly all of the Northwest at the same time, we simply did not have enough resource for the region, especially with one plant down. So this required a considerable purchase of resources from both Canada and the Southwest.

We were told several years ago that the thing to do would be to develop resources and have them on the shelf where we would be able to take them off and put them into operation. What has happened to this concept? Our concern is that we're way behind in where we should be in resource development and acquisition. It seems like the Council has a responsibility here along with Bonneville to help make a lot of this possible.

So our question is, where are these resources and where are the ones that were going to be encouraged when we saw a need in the region? The trend is very clear and evident. One utility alone, Snohomish PUD [Public Utility District], hooked up 7,000 new services last year for a total of 44 megawatts of new load. This should send a clear message to the whole Northwest.

Q. What specific suggestions would you make for Bonneville and/or the Council to be doing? What specific kinds of acquisitions?

We should look at the least costly of these resources and provide incentive for bringing good, environmentally sound resources like small hydro and others on line as soon as possible. Those should be resources that do not detract from the environment.

I remember we asked Keith Colbo and Gerald Mueller[1] what they were doing to streamline the permit process and possibility of bringing good, clean renewable resources on line. We never did get an answer. Modification of existing dams is an example. This could be done very easily without affecting the present operation of these facilities.

Q. What are your views on conservation and specifically on Bonneville's conservation programs?

Conservation has been effective in a limited way. It appears that approximately 300 megawatts of conservation savings have been accomplished since 1981, and almost all of the utilities are involved in the Super Good Cents program, which we feel is a good effort because it is voluntary.

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[1] Former Council members from Montana.

We've seen other conservation activities that have really helped as well. Since we are a large irrigation utility, we have participated in a conversion of pump irrigation to gravity systems, for instance. As a result, we have been able to shut off 2,800 horsepower.

Q. Are there other conservation programs that Vigilante is involved in?

Yes. We've provided water heater wraps, shower flow restrictors and have always given advice on energy conservation in the home. I was first involved in this in 1964, when we were metering electric heat separately in homes and recommending types and amounts of insulation.

Some of our utilities even went as far as guaranteeing the amount of kilowatt–hour usage during the winter months for heating. We were that sure of ourselves. So conservation has been an active part of our utility program for at least 25 years in western Montana.

Q. Do you think that the Council's conservation programs, such as the model conservation standards, are too radical or are they realistic?

We think that mandatory building codes are not the approach. Many Montanans are very resistant to any government, state agency or other, coming in and telling them you're going to build a house only in this way.

We also don't feel that you can impose standards on the western part of the state, and leave the balance of the state to do as they wish. So we don't feel mandatory building codes should be an approach in this field, especially when we feel that we have already pioneered many of the conservation efforts with respect to residential homes.

Q. As the Council develops a new power plan, are you going to be involved? If so, what kind of recommendations will you be making to the Council?

We want to point out to the Council that the greatest part of our service area in western Montana is to the rural rancher and farmer. Most of these people have experienced three tough years and are now carrying debt that they can hardly service. The cost of energy is one of those areas that affects them directly in their operations.

When they have to pay five times what they had to five years ago for power to operate pumps and for other agricultural purposes, they feel the effect of retail rates very directly. We don't feel that the Council has in the past been that sympathetic to the end user.

We are very encouraged by our two present Montana Council members.[2] They are both individuals that rural people can talk to. I would say for the first time since the Council was formed that we have seen such an attitude on the part of Montana Council members.

Many Montanans are very resistant to any government, state agency or other, coming in and telling them you're going to build a house only in this way.

Q. I know that in previous years you have been a harsh critic of the Council. Do you feel that the Council has matured and that there is a role for the Council now?

Our expectation when the Act was passed and the Council was appointed was that we would have some representatives in a regionwide council that we could talk to and have some effective input with. Until John Brenden and Stan Grace were appointed, we didn't feel we could do this.

We felt we were treated as adversaries right from the very start. You don't have a good feeling when you are treated in this manner, especially when you helped pioneer service to most of rural Montana. We had a lot to do with a lot of the original conservation efforts. We've provided service over the past 51 years in most of Montana, so we do have some experience in the field.

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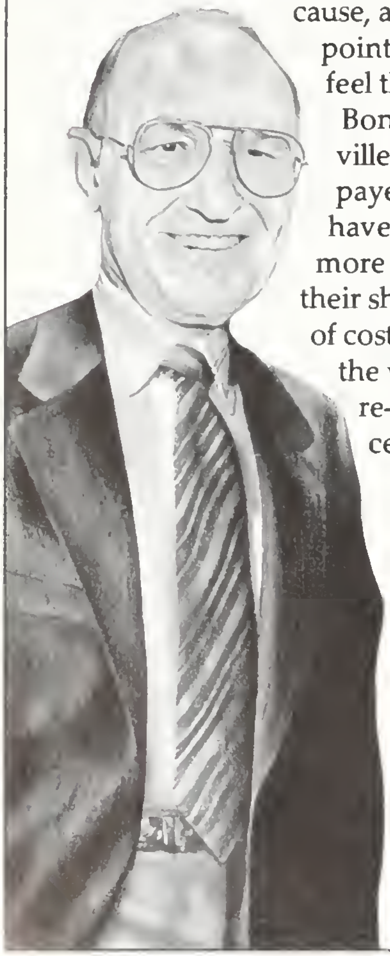
[2] John Brenden and Stan Grace.

Q. If you perceive more willingness to listen to your needs, do you feel that there is a role for the Council in your area?

Oh, I think there is definitely a role, but the input is going to have to be taken seriously. The Council members and staff are going to have to see the actual conditions on the ranches and farms before they're going to understand the seriousness of this present situation.

You can't sit in an office in Portland and visualize what the conditions are out in these rural areas where you have extreme cold weather in the winter and very difficult operating conditions. These ranchers and farmers have to be able to talk to the Council members and show them the real operating problems they have, because, at this point, we feel the Bonneville ratepayers have paid more than their share of costs for the value received.



Q. What do you feel is going to happen in the future in the Northwest power system? Do you have any predictions about what direction utilities are going to take?

It appears that there are going to be more mergers. I would say there will be both in private and public power organizations. In the public power field, we need to become more efficient and more reliable. We're going to have to be able to operate, not only the river system, but the thermal plants with more cooperation across the region. To that extent, we need to help and encourage regional interchanges of power between the Missouri River and the Columbia River basins.

We need to look at ways we can make our present generating facilities more efficient so that we can meet peak load better with existing resources. And as I said before, I think we're way behind in the development of resources. We feel that the Council should take a more pro–active role in seeing that resources are developed as well as conservation.

Q. You mentioned the hydro system upgrades; what other generating resources do you want to see developed?

We've seen a great deal of advance in the field of coal–fired generation, utilitizing new technology which reduces releases into the atmosphere that can cause acid rain. We're blessed with a large reserve of low sulphur coal in the Northwest. We see the time when this is going to have to be used to a greater extent.

We feel nuclear has a very prominent role in the future because of it's dependability, and we feel that the Congress is going to develop acceptable waste disposal methodologies that can be utilized by the industry. We feel that Plant 3[3] will probably be completed.

The refinancing of those plants is now taking place with a savings of about $60 to $70 million a year. These savings are significant because we can't depend on power imports from the Southwest any more than we can on oil from the OPEC nations. You might be able to get some energy from that direction, but the price is going to be whatever the market will bear. To that extent, we feel it wouldn't be wise to be overly dependent on either the Southwest or Canada.

Q. I'm assuming that you're going to participate in Bonneville's Programs in Perspective.[4] What issues are you going to be addressing?

These are the very issues we plan to raise, and we're very encouraged with the Programs in Perspective process. This has allowed a good open forum for all consumers in the Northwest to discuss specific issues with Bonneville. This is the kind of opportunity we wish we'd had with the Council in the past on several issues, such as the protected areas. We did not feel that western Montana cooperatives had an opportunity to provide any meaningful input.

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[3] Plant 3 is a 77-percent completed Washington Public Power Supply System nuclear project located at Satsop, Washington. It is currently on hold along with Plant 1, 63-percent completed, at Hanford, Washington.

Q. You mentioned utility rate increases of 500 percent in the early part of the decade and the problem with the ranchers. Do you think the situation has stabilized, that Bonneville's programs are now more responsive?

Bonneville's programs are more responsive as long as the administrative costs are held down by both Bonneville and the Council. We feel we should get a dollar's value for a dollar spent, and we're concerned about the ineffective management of some of these programs.

To this extent, we feel that the process has improved on the part of Bonneville, especially with Programs in Perspective. But we do not feel there's been adequate input to the Council with respect to the implementation of some of these programs.

We understand there's supposed to be a committee appointed to oversee the [wildlife] mitigation plans for Montana. This committee should be in place now, so they can review what the programs are going to be and what the priorities are. It shouldn't be after the fact, after either the state agencies or the Council have decided where money should be spent and how.

Overall, I would say there seems to be a more reasonable approach on the part of the Council than in the past. But deciding what is best for each area without looking at the area is not the proper approach. You have to involve people, as Bonneville has been doing, to gain the credibility to have a good working relationship over the long term.

Q. As a veteran observer of public power, how do you perceive the changing environment in the utility community right now? Do you see changes in the relationship or balance between public and private power?

I see more regional cooperation between both public and private power. We have to recognize that private power has as their priority a payment to the stockholder, and this dividend payment is an important part of their consideration in any endeavor. Public power is going to look at providing a reliable service to the ratepayer under very difficult operating conditions, usually on a non-profitable basis.

We've got to keep rates at a reasonable level if we're going to see the survival of many businesses in the Northwest, both on the public and the private power systems. The only way that these economies can be accomplished may be through merger in future years.

We still have some of the most difficult areas to serve where they do not have electricity. Some of these extensions are many miles up through rough, rocky and timbered country, where people are now wanting to build, perhaps a second home or a cow camp or a large livestock operation. We have some livestock operations that exceed 40,000 acres. These are truly big businesses, and their investment in land, machinery and equipment to operate such a business has to depend on a reliable service.

You have to involve people. . .to gain the credibility to have a good working relationship over the long term.

We see the power resource situation in the Northwest as critical. We shouldn't have to experience several February 1989s to tell us we have got to move on resource development and acquisition. Any time we can have some surplus, generally there is a market for this surplus, and we can keep from having to utilize more oil, foreign oil in particular, and coal and gas resources to meet the needs on the West Coast.

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4. Programs in Perspective refers to a series of meetings the Bonneville Power Administration holds with its customers and other interested parties to solicit their input on strategic issues.

It's not a bad situation to have some surplus. It provides the region with some assurance that even in very difficult times we can continue serving people in both rural and urban areas.

Q. I assume that the wildlife proposals will be adopted in some form by the time this interview is published. Do you feel that you've had the same communication problems with wildlife, or has it been any better?

We don't feel that the wildlife studies on losses have been carried out in a very professional way. Bonneville ratepayers have been required to pay for studies that should never have been done with the ratepayers paying the bill. We're speaking of studies that were done on non–federal projects, Indian reservations and other areas.

We're not opposed to paying for losses caused by the construction of hydro facilities. But when you have multipurpose projects, where there have been multiple benefits for recreation, irrigation, flood control and navigation, it's high time that the Council, Bonneville and others realize that the utilities are not the ones that are going to pay the whole bill.

We feel reasonable costs can be expected, but we don't feel that the rancher out here paying the bill is going to feel good about paying for the other interests that have benefited, including the various states where these projects are located. These states have benefited greatly from recreation, hunting and fishing revenues. That never would have occurred had it not been for those projects.

Q. You said that you do feel there is a utility responsibility to fish and wildlife. What would you consider a reasonable level of funding for Bonneville?

The Montana trust agreement[5] is perhaps a start in this direction. But we do feel that the fish and wildlife studies were not professionally done. We have cases where the people doing the studies didn't even talk to those who lived in the project areas.

These people knew what the conditions were in the 1920s and the 1930s, long before these projects were developed. Their views on the conditions for fish and wildlife were not even considered relevant. So we don't feel that the loss estimates were accurate. The Montana agreement probably provides overpayment for wildlife that some claim were lost due to construction.

We need more reasonable approaches to funding of both wildlife and fish mitigation. We feel that there should be more close monitoring and evaluation of expenditures funded by the ratepayers. Where are these monitoring committees that were talked about? What has been accomplished by the Council in the areas of equitable funding for fish and wildlife?

What has the Council looked at in terms of offshore fishing effects on the runs in the rivers? We've seen the decline of fishing on Hood Canal where there are no rivers. This indicates that the offshore fishery has had a tremendous effect on the returning runs. I've seen the Russian trawlers, the Korean and the Japanese mother ships with the fishing fleets around them. What is being done about this?

What assurance are we going to have in the future that ratepayer–funded studies are being done only on federal projects and project areas? Has the Council determined that we're not going to have to continue paying for fish, for instance, in areas where irrigation only has been a problem? Those are some of our concerns and some questions we feel should be priorities. ■

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[5] The Montana trust agreement was negotiated between the Bonneville Power Administration and the State of Montana. Bonneville has agreed to pay the state $12.5 million over six years. The state is to deposit the money in a trust to be used exclusively to fund wildlife mitigation at Hungry Horse and Libby dams.

For Power Planners, Wet Sometimes Equals Dry

by Gordon Lee

What happens when a just–add–water power system lacks its main ingredient?

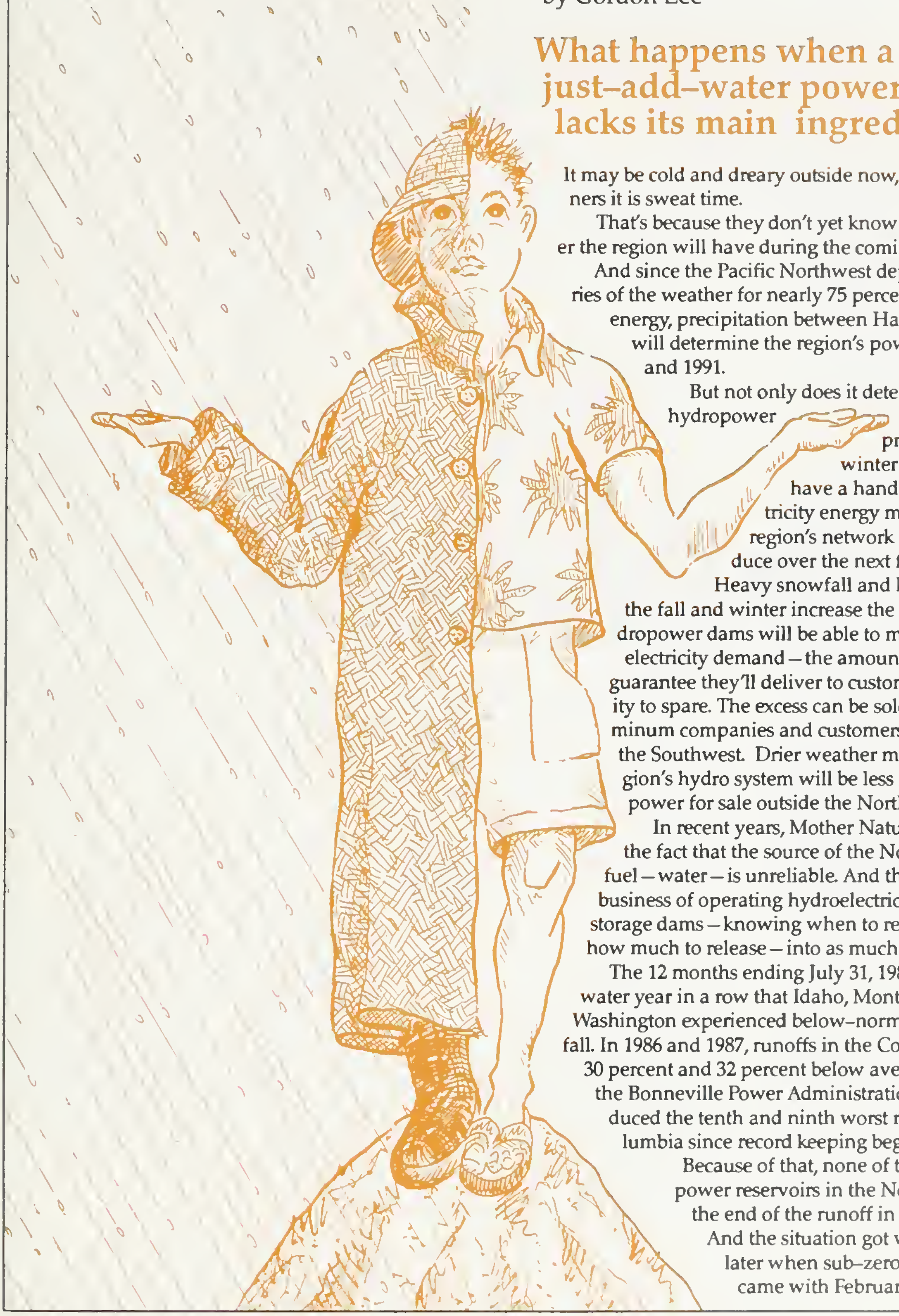

Illustration by Tom Hardy

It may be cold and dreary outside now, but for power planners it is sweat time.

That's because they don't yet know what kind of weather the region will have during the coming three months.

And since the Pacific Northwest depends on the vagaries of the weather for nearly 75 percent of its electrical energy, precipitation between Halloween and Easter will determine the region's power supply in 1990 and 1991.

But not only does it determine how much hydropower the region will produce next year, this winter's precipitation will have a hand in how much electricity energy managers expect the region's network of dams will produce over the next four years.

Heavy snowfall and lots of rain during the fall and winter increase the likelihood that hydropower dams will be able to meet the region's firm electricity demand – the amount of power utilities guarantee they'll deliver to customers – with electricity to spare. The excess can be sold to Northwest aluminum companies and customers in California and the Southwest. Drier weather means that the region's hydro system will be less likely to produce power for sale outside the Northwest.

In recent years, Mother Nature has reinforced the fact that the source of the Northwest's dominant fuel – water – is unreliable. And that has turned the business of operating hydroelectric generating and storage dams – knowing when to release water and how much to release – into as much an art as a science.

The 12 months ending July 31, 1989, was the third water year in a row that Idaho, Montana, Oregon and Washington experienced below–normal snow and rainfall. In 1986 and 1987, runoffs in the Columbia River were 30 percent and 32 percent below average, according to the Bonneville Power Administration. Those years produced the tenth and ninth worst runoffs in the Columbia since record keeping began in 1926.

Because of that, none of the major hydropower reservoirs in the Northwest was full at the end of the runoff in the summer of 1988.

And the situation got worse six months later when sub–zero temperatures that came with February 1989's "Siberian

Express" cold snap forced dam managers in the region to draw down reservoirs even further to meet near-record electricity demand.

In early 1989, Bonneville and the National Weather Service predicted that the spring runoff would approach average levels. But those predictions turned out to be high. Colder-than-normal spring weather delayed the runoff and allowed water to be absorbed into the region's dry soil, whose water tables had dropped during the two previous dry years. And precipitation in June was less than two-thirds its normal level.

To compound the problem, the region's two nuclear power plants – Washington Nuclear Project No. 2 on the Hanford Reservation in southeastern Washington and the Trojan Nuclear Project in northwestern Oregon – stayed out of service longer than the region's power managers had expected. Both plants were shut down in April 1989 for annual refueling and maintenance, but neither resumed service on schedule. The Washington Nuclear Project restarted two weeks later than planned and spent much of August out of service. Trojan was seven weeks late in resuming service and had two unplanned outages in August.

Combined with the low runoff, these outages forced Bonneville to buy power from outside the region so that it could refill reservoirs in the Northwest. It also formally curtailed sales of surplus power, known as nonfirm power, to customers in California and the Southwest in June, a sales halt it had informally put in place in 1987. It made arrangements to import as much as 1,500 megawatts – enough power to light one and a half cities the size of Seattle – from several Northwest and Southwest utilities. And in September, the agency converted sales of power to four California customers into power exchanges, which allowed it to postpone exporting that electricity and retain more water behind the region's dams this fall.

"We thought we'd refill this year, but we were tricked," says Wally Gibson, who, as manager of systems analysis and rates, monitors the Northwest's reservoir operations at the Northwest Power Planning Council. "You need to have enough water to refill the reservoirs before you can sell power to California. Refill has priority over nonfirm sales to California or elsewhere."

Refill, release and other reservoir operations are governed by the Pacific Northwest Coordination Agreement. That agreement, signed in 1964 and due to expire in 2003, established most of the rules for running the region's hydroelectric system. Now adhered to by the U.S. Army Corps of Engineers, the Bonneville Power Administration, the Bureau of Reclamation and 15 Northwest utilities, the agreement choreographs operations of dams and reservoirs on the Columbia River as if they were owned by a single utility.

Under the agreement, utilities providing a service – such as releasing or storing water at the request of other utilities – receive compensation from utilities that benefit from that service.

The agreement regulates reservoir operations by establishing two tools that power operators use each year: the critical rule curve and the energy content curve. The critical rule curve is defined as the level of water the Northwest needs behind its dams to meet the region's basic, firm energy needs. Operators use the critical rule curve to gauge the amount of water the region would need behind hydropower dams during different times of the year to meet firm electricity demand, if the Northwest suffers a repeat of the driest years on record. That "critical" period lasted 42 months, from late 1928 to early 1932.

Under the Coordination Agreement, the critical rule curve sets the water levels in the region's reservoirs. Dam operators cannot draft water from reservoirs if they'll fall below the levels established by the critical rule curve. As long as actual storage in the reservoirs remains above the critical rule curve and current stream flows are no worse than historical amounts, planners know water levels will be high enough to ensure the maximum amount of firm power. The system also will have enough water to maintain stream flows for irrigation, navigation, domestic and industrial water supplies, and fish and wildlife needs.

The energy content curve adds a margin of safety to that calculation. Based on forecasts of current year streamflows, this tool calculates how much water must remain in each reservoir to create a 95-percent chance of refilling the reservoir by the next July 31. This guarantees that the region doesn't steal from its future by selling nonfirm, surplus hydropower one year that it may need to meet basic demand the next.

"These curves tell us how far we can draft the reservoirs and still refill," Gibson says, "and they define what is secondary, rather than firm, power."

Since 1973, when the last of the storage dams required by the 1964 Columbia River Treaty between the United States and Canada was completed, the region has been able to store some 40 percent of the Columbia Basin's annual runoff. When the reservoirs are full, the amount of water behind them would supply a city the size of Seattle for 62 months.

The Coordination Agreement regulating use of that stored water expires in 2003, and negotiations regarding a new agreement are due to get under way during the next few years. The outcome of those talks could have major implications for the Council's future planning, and the Council intends to monitor the status of the agreement as it prepares an electrical power plan for the region in 1990. ■

Snowpack Fortune Telling

Illustration by Lyn Nance

Estimating each year's spring runoff begins early. In January, teams from the National Weather Service take snowpack readings at numerous mountain sites throughout the Pacific Northwest. By taking core samples of the snowpack at various depths, Weather Service personnel can gauge the water content of the region's snow.

These readings, combined with the Weather Service's long-range weather forecasts, make up the first cut of runoff projections power planners use to predict how much electricity the region's hydropower dams will be able to produce. The Weather Service revises its projections monthly. The Bonneville Power Administration relies heavily on these forecasts, but augments them with information from its own data collection network.

The monthly projections change as the Weather Service gets new snowpack information. In January 1989, for example, it predicted that the Columbia River's runoff – measured at The Dalles, Oregon – would be 101 million acre-feet[1] through July 31. That would have equalled 93 percent of the average runoff over the previous 25 years.

From February through May 1989, the Weather Service lowered its prediction to some 98.6 million acre-feet, or 91 percent of the 25-year average.

By July, as the year's cooler, drier weather pattern became evident, the service lowered its projection again, to 90 million acre-feet, which amounted to 83 percent of the historic average. For energy planners, that prediction meant that they shouldn't expect the region's major hydropower reservoirs to refill entirely during the coming water year.

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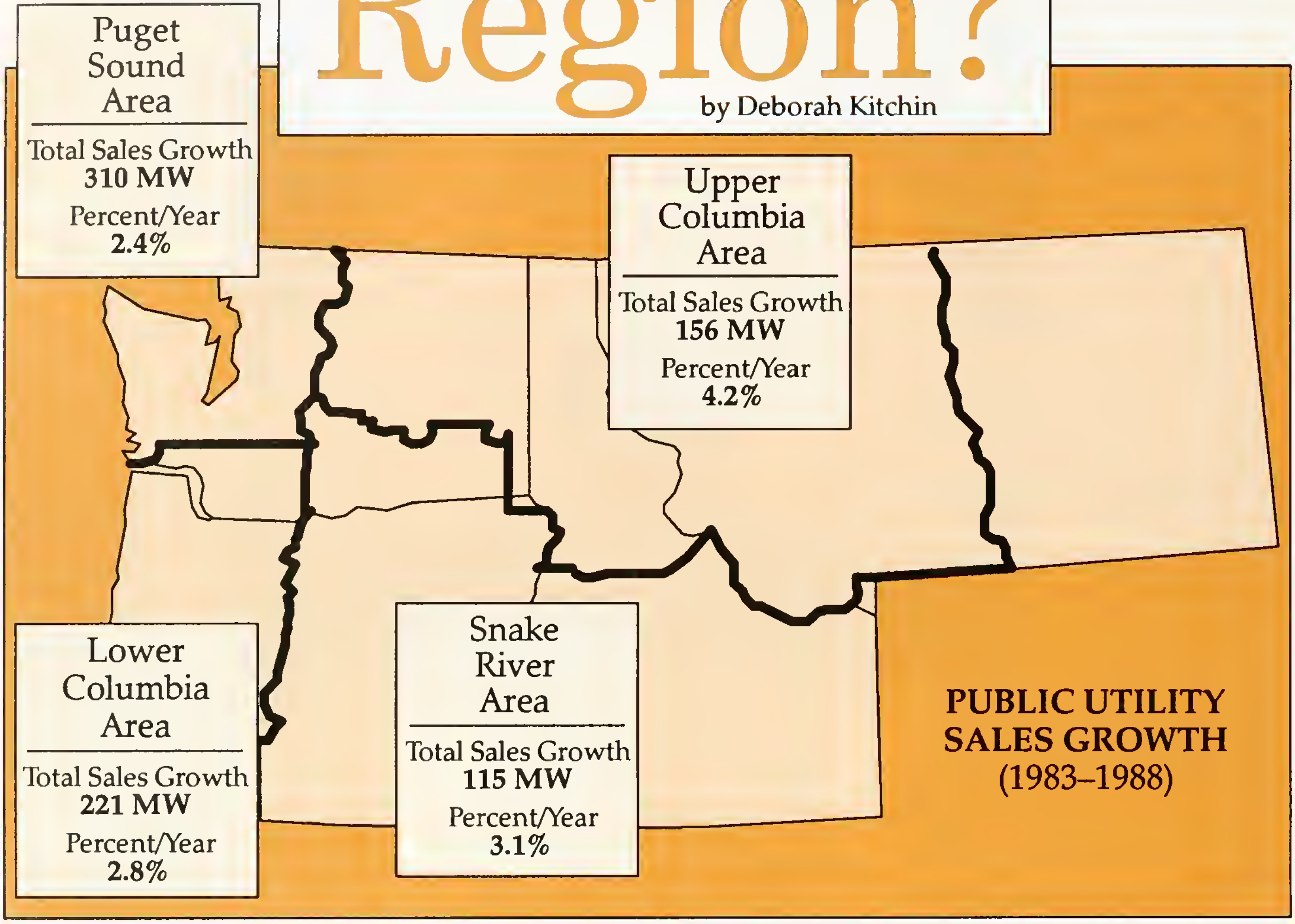
[1] An acre-foot of water is the amount of water that would cover one acre one foot deep.

How Grows The Region?

by Deborah Kitchin



PUBLIC UTILITY SALES GROWTH (1983–1988)

The Northwest's energy use perks up on both sides of the mountains.

Contrary to some opinions, all growth in the Northwest economy in recent years has not occurred around Puget Sound and in the Willamette Valley. While stories of the rapid expansion of The Boeing Company in Seattle and the sprouting of Oregon's silicon forest are well known, a recent review of the region's power sales, which are one reflection of the state of the economy, shows a renewed vigor for business in the Northwest outside the I-5 corridor, too.

Certainly, geographic differences in climate, natural resource endowment and an abundance of shipping ports have led to differences in industrial mix, population density and other economic characteristics from one side of the Cascade Mountains to the other. But new food processing plants, recent increases in electronics employment in Idaho, and recovery in the forest products industry have translated into pockets of growth in electricity use throughout the region.

Public perception is correct that on the westside private utilities are increasing power sales at a faster rate than are private utilities in the eastern part of the region. But the region's public utilities show a reversal of this pattern. And power use is growing in both the public and private utilities.

Staff at the Bonneville Power Administration have examined regional power sales from 1983 through 1988, breaking sales out by the agency's service area, by public and private utilities and by customer classes. This analysis shows that the public utilities east of the Cascades increased power sales at a faster rate than public utilities west of the Cascades, during the five-year study period.

While the eastside public utilities accounted for 27 percent of all public utility loads in 1988, they accounted for 34 percent of the growth in electricity demand from 1983 to 1988. Admittedly, the relative megawatts of change were greater on the westside, but growth on the eastside was far from negligible.

In 1989, sales data for the first six months of the year show sustained growth in electricity sales for public utilities east of the Cascades.

The accompanying map shows the geographic coverage for Bonneville's area offices and the relative growth in sales in each area. The Puget Sound Area includes northwestern Washington. It holds the largest population and includes the region's largest city, Seattle. Aerospace is the primary industry, but forest products are significant in the area as well.

The Lower Columbia Area includes western Oregon and a few counties in southwest Washington. The largest industry in the Lower Columbia Area is forest products, but Portland also has a diversified manufacturing base. These two areas comprise the western portion of the region, which accounted for 73 percent of the region's public utility sales in 1988 and 69 percent of the private utility sales.

The Snake River Area includes eastern Oregon, southeastern Washington and southern Idaho. The Upper Columbia Area includes northeastern Washington, northern Idaho and western Montana. The total area east of the Cascades is much larger geographically than the coastal strip that makes up the western areas, but only about a third of the region's population lives in the East. Within this large land mass, there is a great deal of geographic and some industrial diversity.

Electricity Sales Growth

	Change in MW 1983–1988	Share of Change	Average Annual Rate of Growth (%/year)
Public Utilities			
West	531	66%	2.6%
East	271	34%	3.7%
Total	802	100%	2.9%
Private Utilities			
West	688	80%	2.9%
East	168	20%	1.5%
Total	856	100%	2.4%

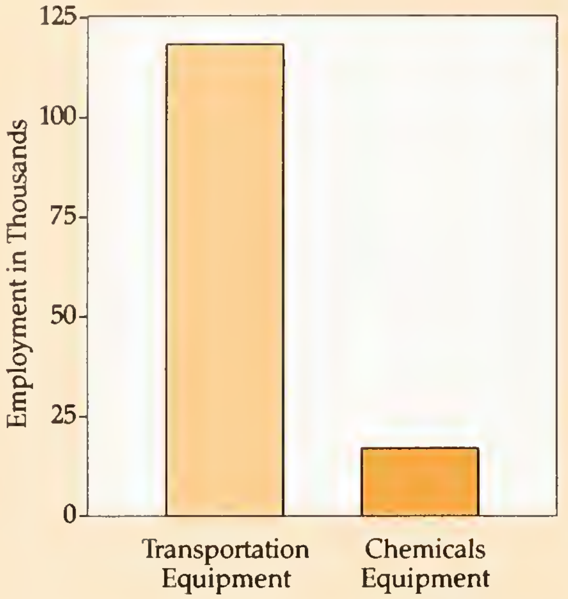
Most enterprises on the eastside are resource-based. They include agriculture and related food processing, forest products, chemicals and mining. Nearly all of the region's irrigated agriculture is in the eastern two service areas. But the electronics sector is also establishing a presence in Idaho, bringing a 30-percent increase in employment there since 1983. Tourism is picking up, too, especially in central Oregon, Sun Valley, Idaho, the Finger Lakes region in northern Idaho and in the Rocky Mountains.

Still, growth in electrical use east of the Cascades is difficult to characterize. It represents a mixture of recovery from the recession of the early 1980s and new growth based on specific localized developments. Not all eastern utilities have participated in the growth.

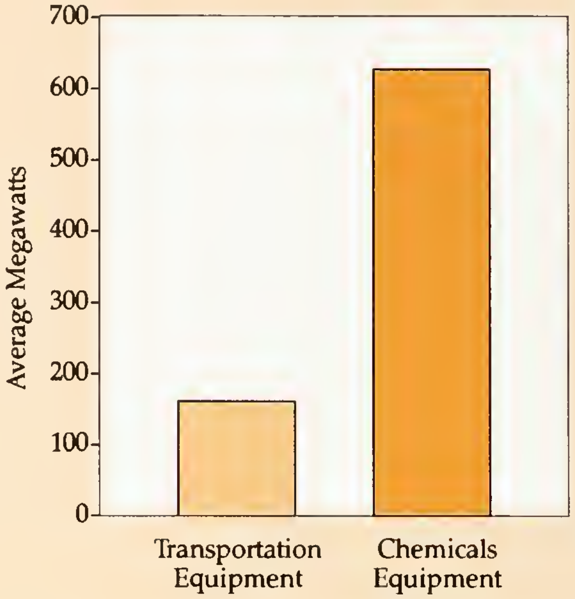
According to Oscar Armendariz in Bonneville's Upper Columbia Area, "most of the growth in electricity sales to industry in the Upper Columbia Area has occurred in Grant County Public Utility District, which enjoys low industrial electricity rates." For the eastside in general, recovery in the forest products sector, growth in food processing, unusually dry weather conditions that boosted irrigation, and expansion in chemical production are some of the reasons power use increased.

Additional sales of power to service farm irrigation accounted for about 17 percent of the increase in public utility power sales. According to Rick VanOrden in Bonneville's Snake River Area, where most of the irrigation loads are, "growth in irrigation sales resulted from weather conditions, rather than from increased irrigation capacity."

But this growth in power sales, while good news for the long-ailing eastside economy, did not necessarily translate into significant increases in



1987 Employment



1987 Electricity Use

employment. In some cases, improved labor productivity, plant conversions from other fuels, and growth in electricity–intensive industries have led to load growth without an equivalent growth in employment.

The industries where power sales were up – forest products, chemicals and food processing – are among the most electricity–intensive industries in the Northwest. The chemicals industry, for example, consumed 36.6 average megawatts per thousand jobs in 1987, while the transportation equipment industry, dominated by aerospace, used only 1.4 average megawatts per thousand jobs.

Put another way, 118,000 people were employed in the region's transportation equipment industry, which consumed 160 average megawatts of power in 1987. The chemicals industry consumed four times as much power, but employed only 17,000 people.

In 1989, sales data for the first six months of the year show sustained growth in electricity sales for public utilities east of the Cascades. In the short–term, the prospects for persistent, although perhaps slower, growth in the energy–intensive industries are good.

Announced new plants in the food processing, pulp and paper, chemicals and mining sectors will continue to add relatively concentrated loads in specific locations. The long–term outlook is good as well. While growth may be uneven because of business cycles and weather impacts, the richness and diversity of the natural resources are likely to sustain the region in the long run. ■

Deborah Kitchin is the Council's demographer/economist.

Keeping the Currents Current

by Terri Wilner

Efficiency and automation prepare Montana's Hungry Horse Dam for the 21st century.

In the past, the volume of water running in the South Fork of the Flathead River in northwestern Montana depended on how much rain and snow fell from the heavens. But soon, it also will depend on the push of a button on a computer console in central Washington.

That's because renovations under way at 35-year-old Hungry Horse Dam in Montana will automate its operation, allowing it to be run by remote control from a computer center at Grand Coulee Dam, located 300 miles away in central Washington.

Automation will be one of a series of renovations at the hydropower dam during the next few years. The Bureau of Reclamation, which runs the facility, also intends to overhaul Hungry Horse's four giant turbines, thereby boosting its peak electric generating capacity to 428 megawatts. That would be a 42-percent jump from the dam's 285-megawatt capacity today.

Those renovations come none too soon for the region's electrical power picture. Thanks to strong economic growth, the Pacific Northwest's electricity surplus – which stood at 2,600 megawatts three years ago – has fallen below 800 megawatts. Growing electricity demand could deplete that surplus altogether by the early 1990s, unless the region finds new sources of power.

The renovations at Hungry Horse will take four years, according to Dennis Christenson, the dam's superintendent. The Bureau of Reclamation will rebuild one turbine generator a year, which will allow the dam to remain in service.

Photo by Carlotta Collette

Most of the boost in capacity will come from installing new conductors in the dam's generators. These modern conductors will have thinner insulation than the old versions, which allows more room for conducting material in each generator. That reduces resistance losses and increases the rated capacity for each generator.

The renovated generators will require more water at peak capacity than the older versions. But Christenson said he doesn't anticipate that will cause problems for fish residing in Hungry Horse's reservoir. While the renovated generators will require more water from the dam during short-term peak periods, the dam's total energy output each year – 114 average megawatts – will remain the same, he noted.

Automating the dam's controls also will make it more efficient, Christenson added. The South Fork of the Flathead drains into the Columbia River above Grand Coulee, making it logical to control the Montana operation from that downstream site. Those controls at Grand Coulee will connect to five remote terminals at Hungry Horse via existing Bonneville Power Administration microwave links.

Stan Grace, one of two Montana members on the Northwest Power Planning Council, commended the bureau for its strategy to improve Hungry Horse's efficiency. "Hungry Horse is an important headwaters storage reservoir, and is extremely valuable to the regional power system," he said. "Any improvement in its performance will benefit the entire hydropower system, and ultimately help keep the cost of electricity low."

SHORTS

Electricity resource planners in nearly every state are using or looking into least–cost planning.

According to a recent report published by the Electric Power Research Institute (EPRI), a national survey of regulatory commissions revealed that at least 17 states have formal least–cost strategies. Planners in 11 states are preparing least–cost rules for regulatory or legislative review. Seven more states are weighing least–cost approaches to energy planning.

The report can be obtained from EPRI's Research Reports Center, 415–965–4081. [Source: *End–Use News*, Summer 1989.]

September's sale of revenue refunding bonds by the Washington Public Power Supply System was surprisingly strong.

Investors were so interested in the tax–exempt offering of bonds to help refinance the debt on two mothballed nuclear power projects – Plant 1 at Hanford and Plant 3 at Satsop – that $721.7 million in bonds were sold, rather than the anticipated $611 million.

The sale of those bonds at lower interest rates than they originally carried will save the supply system $20 million to $25 million a year over the next 30 years, the system estimated. [Source: *The* (Portland) *Oregonian*, 9/13/89.]

Scientists at The Boeing Company in Seattle recently announced they'd perfected the world's most efficient solar cell.

The invention of the cell – a device that converts sunshine directly into electricity – achieved an efficiency of 37 percent in laboratory tests. Efficiency is the ratio of electricity produced to the solar energy received on the cell's surface.

The previous record was 31 percent, achieved last year by scientists at Sandia National Laboratory in Albuquerque, New Mexico.

Most solar energy plants in commercial use by utilities average 15–percent efficiency today. The Boeing invention – if commercially viable – would cut in half the panel area required to produce the same amount of power. That would also shrink the area of land a plant would need, which often is seen as a major disadvantage of solar power.

Boeing's announcement didn't reveal the cost of the new cell. [Source: The *Seattle* (Washington) *Times*, 9/15/89.]

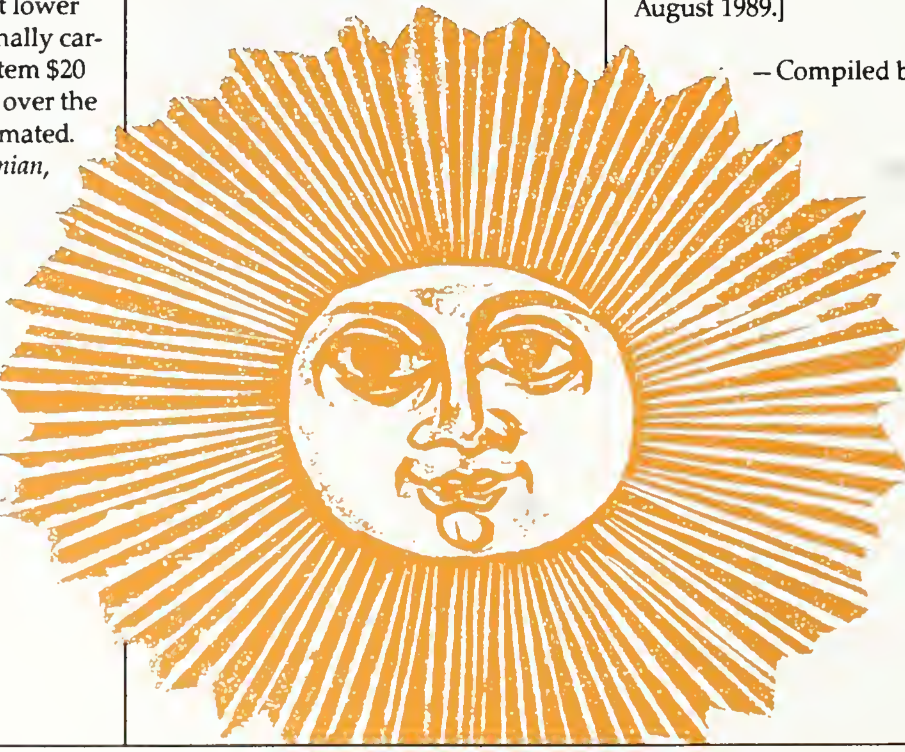
This has been a heavy year for solar flares, and 1990 should be worse.

That spells bad news for power supply systems, whose transmission networks are susceptible to variations in magnetic fields brought on by solar storms.

The most dramatic evidence came on March 13, 1989, when three million customers in Montreal and Quebec were without electricity for nine hours. Seven static compensators used on transmission lines by Canada's Hydro Quebec shut down as a result of earth magnetic currents induced by heavy solar flares. While Hydro Quebec's systems have long transmission lines and unusual compensators, Scotland and Scandinavia also had voltage fluctuations.

It takes 13 seconds for intense ultraviolet radiation to hit the earth after a solar flare. Some two days later, charged magnetic particles arrive, temporarily upsetting the earth's magnetic field. The top of the current solar cycle is due in 1990 and could last 11 years. Experts fear this solar cycle could be the heaviest since 1957. [Source: *Energy Economist*, August 1989.]

– Compiled by Gordon Lee



CALENDAR

November 8–9 – Northwest Power Planning Council meeting at the Colonial Inn in Helena, Montana.

November 12–15 – "Celebrating 40 Wondrous Years," the Tenth Annual International Irrigation Exposition and Technical Conference in Anaheim, California. Sponsored by The Irrigation Association. For more information: The Irrigation Association, 1911 N. Fort Myer Drive, Suite 1009, Arlington, Virginia 22209, 703–524–1200.

November 16–17 – "Idaho Northwest Energy Code Conference" at the Elkhorn Resort in Sun Valley, Idaho. Sponsored by the Idaho Association of Counties and the Idaho Department of Water Resources, Energy Division. For more information: Deni Gibbs, Association of Idaho Cities, 3314 Grace Street, Boise, Idaho 83703, 208–344–8594.

November 26–29 – "Nuclear Energy Forum" the annual meeting of the nuclear energy industry at the Westin St. Francis in San Francisco, California. Sponsored by the U.S. Council for Energy Awareness. For more information: U.S. Council for Energy Awareness, Nuclear Energy Forum, 1776 I Street, N.W., Suite 400, Washington, D.C. 20006–2495, 202–293–0770.

December 13–14 – Northwest Power Planning Council meeting at the Council's central office in Portland, Oregon.

A more detailed calendar of Council committee meetings and consultations is carried each month in *Update!* See order form on back cover.

– Compiled by Ruth L. Curtis

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The Northwest Power Planning Council is required to develop a program to restore the Columbia fisheries and a regional electric energy plan emphasizing cost-effective conservation and renewable resources.

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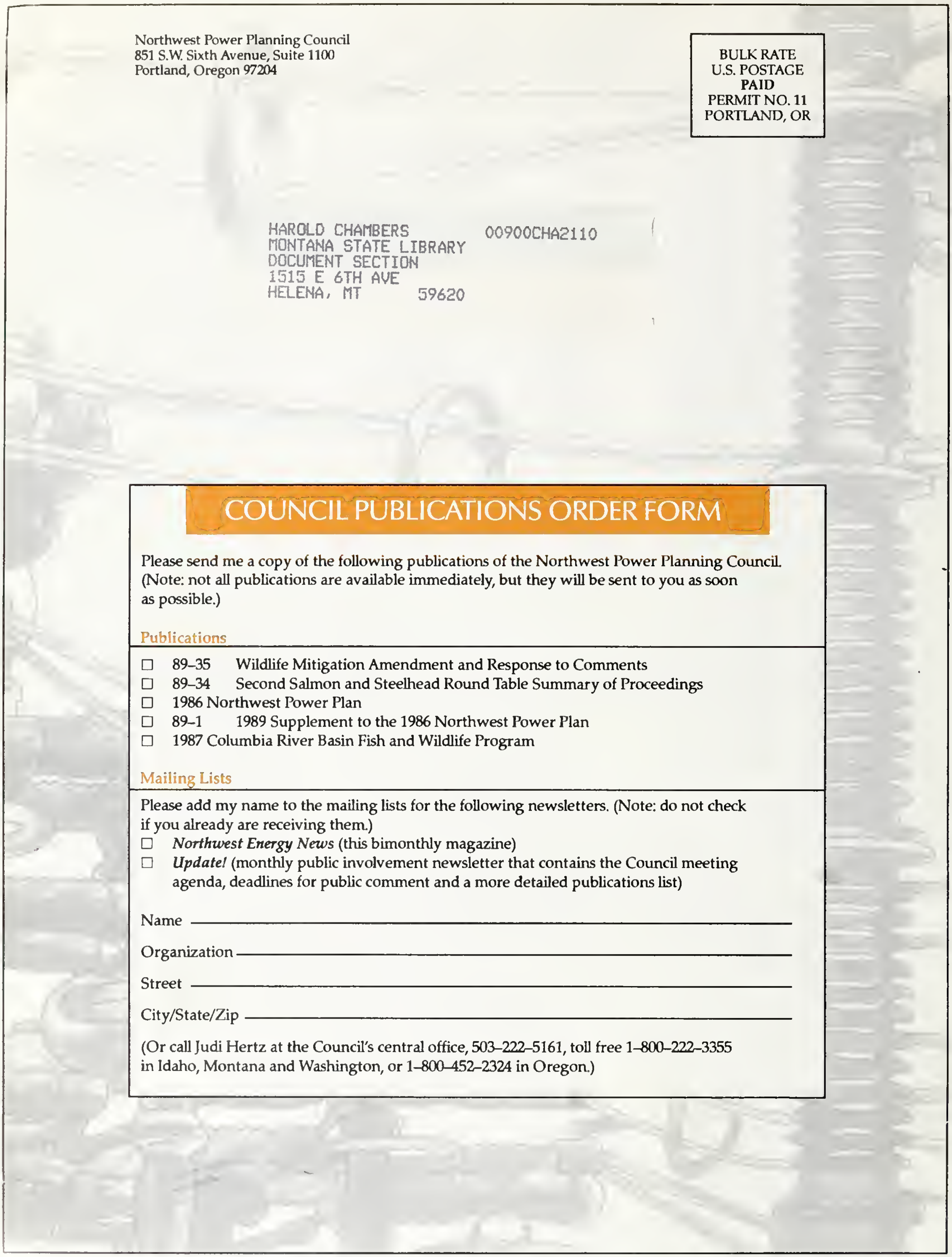

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COUNCIL PUBLICATIONS ORDER FORM

Please send me a copy of the following publications of the Northwest Power Planning Council. (Note: not all publications are available immediately, but they will be sent to you as soon as possible.)

Publications

☐ 89–35 Wildlife Mitigation Amendment and Response to Comments
☐ 89–34 Second Salmon and Steelhead Round Table Summary of Proceedings
☐ 1986 Northwest Power Plan
☐ 89–1 1989 Supplement to the 1986 Northwest Power Plan
☐ 1987 Columbia River Basin Fish and Wildlife Program

Mailing Lists

Please add my name to the mailing lists for the following newsletters. (Note: do not check if you already are receiving them.)

☐ *Northwest Energy News* (this bimonthly magazine)
☐ ***Update!*** (monthly public involvement newsletter that contains the Council meeting agenda, deadlines for public comment and a more detailed publications list)

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(Or call Judi Hertz at the Council's central office, 503–222–5161, toll free 1–800–222–3355 in Idaho, Montana and Washington, or 1–800–452–2324 in Oregon.)